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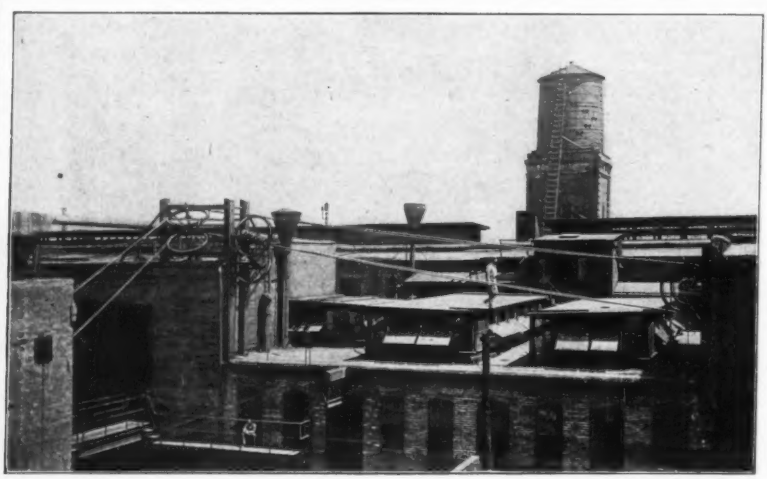

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THE PRACTICAL ISSUES OF THE COTTON CONFERENCE.

The International Conference of Cotton Growers and Manufacturers held in Atlanta last month was in its general features an aftermath of the Vienna Congress of Cotton Spinners and Manufacturers. Many of those who took part in the Vienna congress were present at the Atlanta conference, and rehearsed their views on the latter occasion and incorporated them in resolutions that were adopted without dissention on the part of both the spinners and growers, showing a unanimity of opinion and feeling that is seldom seen in a gathering of this sort, composed of individuals whose trade interests have always been thought to be more or less antagonistic.

The result of this unanimity cannot help being productive of great practical good to those concerned in the issues of the deliberations. The spinners better understood the feeling and position of the planters in their efforts to turn their vocation into a profitable occupation, and the growers, on the other hand, received new light on the difficulties that spinners are obliged to contend with in adapting their manufacturing facilities to the changing conditions that are constantly facing them in the commerce of the world.

The growers showed a commendable disposition in their willingness to accept the suggestion of the spinners in every particular affecting the culture, harvesting and marketing of their product, in order that the economy of manufacturing shall be reduced to a minimum, so far as it relates to the movement of the raw material from the plantation to the factory, in return for which the only compensation asked for is that the price of the staple shall be kept at a figure that will be remunerative to the producer. This only and apparently simple request, so earnestly presented on the part of the planters, received the full sympathy of the spinners notwithstanding the immutable fact that the price of a commodity cannot be determined by any fixed resolution or sentiment, but must be governed by the inexorable conditions of trade, the final arbiter of which is the consumer of the manufactured product.

It will require a considerable length of time to consummate the reformations that were urged at the conference, especially of methods that have been in vogue for half a century or more in defiance of suggested improvements by all concerned in the preparation and distribution of cotton. The conference can be regarded in no other light than a substantial stepping stone in an advance toward a desired goal, which cannot be expected to be reached for years if not a generation. It will be a hard and difficult problem to overcome present methods as practiced on the plantation and in the trade. Invested capital in machinery and in facilities for the movement of the crop have to be considered and dealt with conservatively yet determinedly. Great undertakings as those suggested at the conference cannot be effectually carried out except by slow processes.

The Atlanta conference impressed upon all the delegates the fact that there is in reality no antagonism or even diversity of interests between the growers and spinners,

but rather that there is a unity of interest, notwithstanding there may be elements of a controversial or a kind of conflicting relation in matters of trade, which apply to all classes of industry and to all branches of commerce. In trade relations the spinner acts the same as the merchant or manufacturer in other lines of business, in his efforts to buy his raw material as low as his competitor, and at a price which will insure him at least a fair profit on his product. Every shrewd or sagacious purchaser of a commodity or a privilege is supposed to act on the business rule of pressing the price to be paid for his purchase down to the very lowest level at which it can be secured, without leaving any advantage in this respect to his competitor. It is not that the spinner desires to force the price of his cotton below 15 cents per pound, for example, but that he must satisfy himself that this is as low as it can be obtained by others as well as himself. This principle of trade pertains to everything that enters into commercial transactions, and is an element that is taken into consideration by planters themselves, when they attempt to consummate a trade for land, machinery, implements or live stock. Therefore, we say that the spinner and grower are not antagonistic in their related interests, and only appear so when following the inexorable laws of trade.

The Atlanta conference confirmed practically all of the recommendations that were made at the Vienna congress in reference to the marketing of cotton. One of the most important recommendations that were favorably passed upon at the Atlanta conference was that favoring the compression of cotton at the gin. This may take some time to bring about, but there is an absolute certainty that it is only a question of time, and not only that the compression shall be done at the place of ginning, but that it shall be effected at a uniform density, and the bale properly covered and otherwise protected against damage during transportation. The advantages of compressing at the gin are many. Among them may be mentioned that every bale can be loaded on the car at the interior point of shipment, and delivered without rehandling at its destination at the port, at the mill, or at a distributing point for export or carriage to the point of consumption. There is no uncertainty or incalculable delay, as is now met with, for second compression, resulting in better service and less damage from start to finish; and with all this the cost of transportation, as the consequence of this lesser amount of handling, can be greatly reduced, and no less remunerative to those who transport it, but rather a relief by enabling the carriers to use their present facilities to much greater advantage and multiply their usefulness. The railroads will be benefited in the one essential thing at the present time, of utilizing their rolling stock to greater availability for doing double or treble duty. This additional service is secured in the less loss of time resulting from unloading and reloading at points of second compression, less number of cars for carrying the same weight of cotton because of the increased density of the bale, less number of locomotives because of the less number of trains to haul, and the elimination of other expenses that readily suggest themselves. One of the consequences of this reduction in cost for moving the cotton crop will be a reduction in freight rates, which one of the speakers—the treasurer of a New England mill—at the Atlanta conference recognized, and so declared, in his willingness to pay for his cotton a dollar a bale more if it were compressed at the gin, in the belief that he could more than recoup himself in the lesser freight charges that he could secure on the shipments to his mill.

We believe that this question of compression at the gin involves more points of value to the grower and the spinner than anything that came up for discussion at the Vienna or the Atlanta meeting. It is the fundamental beginning of a long line of improvements that everyone desires to see consummated. It has a long train of benefits to every one concerned in the movement of the cotton crop from the plantation to the factory. It touches nearly every phase of the troubles that are experienced in the distribution of the raw material. If compression can be secured at this initial point at a density of from 35 to 40 pounds to the cubic foot, with the bale well and securely wrapped with a strong covering and suitable bands, the larger part of the difficulties surrounding the movement of cotton will be solved, and but little more need be desired so far as the planter is concerned in his relations to the spinner. Other evils to be rectified will fall naturally into their places, and will be made to conform to the new conditions that are instituted, on a satisfactory basis.

THE KNIT GOODS INDUSTRY IN THE SOUTH.

The knitting industry, and particularly that part pertaining to hosiery, in the Southern States, is making rapid progress, proportionally in excess of that in any other section of the country. In 1899, there were in the Southern States 71 knitting establishments, 119 in 1904, and 165 in 1907, being an increase of nearly 40 per cent. in the last three years. In value of product there has been an increase during the last eight years of fully 200 per cent., of a permanent character. The South, however, thus far, has confined itself chiefly to the manufacture of hosiery, for which cotton alone is consumed. In this respect knitting in this section is, in a measure, auxiliary to cotton spinning, which supplies the yarn, as nearly all of the knitting mills purchase their yarn instead of spinning it themselves. This method of manufacturing, however, conforms to the general practice among knitting mills throughout the country, over 84 per cent. of which purchase their yarn. While the use of cotton is exclusive in the Southern mills it applies but little less so in the United States as a whole. The tendency toward the exclusive use of cotton in knit goods of all kinds is increasing; for example, one-third of the raw material used in the knitting industry in 1890 consisted of wool and two-thirds of cotton, while today the proportion is about one-sixth wool and five-sixths cotton. It is for this reason that this industry has been taken away from its alliance with the woolen and given a status by itself, though more closely identified with cotton than with wool manufacture. The industry, however, has an individuality that entitles it to an independent position in its industrial relations.

There are no fancy knit goods made in the South, the products of the mills in this section being confined principally to plain hosiery, as already stated, and only to a limited extent to underwear for men, women and children. The underwear mills are in North Carolina, Georgia, Tennessee and South Carolina. Nearly all of this class of manufacture is of the ribbed order. In the manufacture of

hosiery most of the Southern mills make seamless hosiery for men's and women's wear, next to which is that for children's wear, with a fair proportion of women's ribbed goods, while three mills are on full-fashioned hosiery, and one mill making lumberman's socks. The greatest variety of product is in North Carolina.

Although the latch needle machine, largely because of its large production, is the one more commonly employed, the spring needle machine is in evidence in many of the mills, especially in those that make the finer goods. The proportion of these two classes of machines is about 92 per cent. for the latch needle and 8 per cent. for the spring needle. This compares favorably with the proportion found in the industry as a whole throughout the United States, the proportion being for the whole country 84 per cent. for the latch needle and 16 per cent. for the spring needle, the former being chiefly employed on automatic circular hosiery and ribbed circular machines, and the latter on plain circular and automatic circular hosiery machines.

CHILD LABOR IN THE SOUTH.

In pursuance of a call of Governor M. R. Patterson of Tennessee, and in accordance with a joint resolution of the legislature of that State, a conference of the representatives of textile interests, including manufacturers and those of labor organizations in the cotton States, met in the city of Nashville on the 14th of last month to consider the question of child and female labor in shops and factories, with the view of adopting uniform laws that will be "agreeable and just to the respective parties in interest."

We think every one will agree that there should be uniformity in the laws of States, where conditions are similar, affecting the employment of labor so that it shall be just and equitable, along lines that will be advantageous to the working classes with a proper regard to the requirements of the manufacturing industry. But according to our political institutions affecting federal and State autonomy, there is no political machinery that can be put into motion that will establish uniformity of laws for all the States, even in any particular section, unless each of these States is disposed to enter into an agreement by which uniformity shall be established.

Under present conditions we doubt if any practical benefit will be derived from the Nashville meeting any more in the South than has been the case in New England. The States in the latter section are not all of one mind in the particulars of their laws affecting the employment of persons in mills.

The several manufacturing States in the South have enacted laws affecting the employment of children in factories; for example, there will come into force next January, in North Carolina, a law limiting the employment of children so that none under twelve years of age shall work in a factory, and none between twelve and thirteen unless the child has had four months of schooling in the preceding twelve months, and that none under fourteen shall do night work between 8 p. m. and 5 a. m. In addition to this, the hours of labor for all employees will be 66 hours per week.

South Carolina has a law that has been in force since May 1, 1905, to the effect that no child under twelve years shall be employed in a textile factory. This species of legislation in this State has been progressive, the age limit being fixed at ten years in 1903, and at eleven years in 1904, showing a progressive spirit toward ameliorating the conditions of labor with due regard to the obligations of the present and coming generations of those who are to exercise the rights and privileges of citizenship, and the responsibilities of parentage.

Georgia has also taken progressive steps, in first establishing the age limit of employment at ten years, in 1906, and at twelve years after January 1, 1907, and at fourteen years after January 1, 1908, and only then in case the child can write its name and simple sentences, and shall have attended school for twelve weeks of the preceding year.

Alabama allows no child under ten years to be employed, and none under twelve years unless a widowed mother or a disabled father is dependent upon its work.

The laws of Tennessee limit the employment to fourteen years of age. Texas allows no child under twelve years of age to be employed in a factory, and none under fourteen years unless it can read and write, or has a widowed mother or parent incapaciated to support it.

In view of the fact that the United States government is conducting at present an investigation into the conditions of women and children labor in the United States, and also that a commission has been appointed by seven or eight organizations in this country, as one of the issues of the late conference of the Child Labor Commission in Washington, D. C., at which there were present representatives from labor associations, including Mr. Gompers and six others, and also representatives from the Women's National Federation of Clubs, and some manufacturers, we are inclined to think that it was unnecessary for a conference or meeting such as that recently held in Nashville, as it is hardly to be expected that anything done at this time will be helpful toward the solution of so important a question as that which came before it. That something may come out of the commission which was established at Washington is within the limits of reasonable expectation, when it is considered that at the head of the commission is Ellison A. Smyth, president and treasurer of the Pelzer Manufacturing Company, Pelzer, S. C., who, with his associates, is working in conjunction with the United States officials now investigating the labor question as above noted.

We are not ready, however, to endorse, in advance, any of the conclusions that may be arrived at by any commission, however much faith we may have in the integrity of the views expressed by such a body, even when headed by men of such well-known ability and probity as Mr. Smyth. We can only hope that something of value may be suggested in any report that may be made, but doubt if anything can be proposed that will be of national import in details of application affecting the various industrial conditions and necessities of the different States.

The labor question, in its manifold phases, is a popular theme, which economists and others enjoy delving into, without much consideration, in too many instances, to its relation to any peculiar need of communities and industries. The subject is not a psychological one, but purely a practical one in its common sense relation to existing conditions. As an economic question, States have to regard it in connection with their own industrial positions and requirements, which can be reformed only by gradual growth in conformity with changes that are worked out along lines

that will not disturb the natural trend of industrial development peculiar to the progress of manufacturing conditions and environments.

It certainly is not a political question, and should be debarred from any association with it, and relegated entirely to its proper place as a matter to be considered purely from an industrial point of view. Nothing could be more damaging to the proper relations that should exist between employer and employee than to make this subject an issue for party politics. Yet it is well known that plans are being formulated to induce the laboring classes, through their organizations, to consider and act upon this matter, and make it an issue in party platforms, upon which representatives to State legislatures and to the national congress are to be elected. Such labor leaders as Samuel Gompers are already doing all they can to take labor questions outside of their proper surroundings, and make them a theme for demagogic discussion, in which we are prone to believe the rank and file of wage earners are not in real sympathy.

RAILROAD COMPANIES SHOULD NOT BE COTTON COMPRESSORS.

In reference to the recent decision of the Interstate Commerce Commission, relating to the question of compression of cotton in transit from one point to another on a railway, in which the Commission ruled that the railway company cannot deal with the question of compression as it sees fit without regard to the effect which this practice may have upon the transportation of cotton, Silas I. Hyman, secretary-treasurer of the Luce Cotton Compress & Cotton Company, New Orleans, La., writes us as follows:

"We favor the divorcing entirely of the railroads from the matter of compression, and the publishing of one rate on flat cotton, and another rate on compressed cotton. We can see no reason why a railroad should have anything to do with the putting of cotton in shape for shipment, any more than that they should take up the boxing of groceries or other goods. If they desire to make a rate on compressed cotton that will induce its compression, and thus save them car usage, it should be their privilege to do so; but we think the matter of compression should be left entirely with the shipper.

"A matter of still greater and growing importance, appears to us to be this: In the past, there has been little difference in the density of cotton,—that is, flat bales have run about 12 pounds, and compressed about 22 pounds, so that one rate for each has been fairly equitable. With the growth of gin-compression, however, with its increased density, and consequent increase in the car-carrying capacity, there should be some provision made to give the cotton having the higher density a rate commensurate with its advantages to the railroad. Under the present method, the average carload of compressed cotton is about 25,000 lbs., being about 52 bales of a density of some 22 lbs. per cubic foot. There are on the market several gin compresses which give a density of from 30 to 40 pounds, and giving one car a carrying capacity of 40,000 lbs. or more, but no compensation is offered to the shipper for this advantage. Furthermore, the car-days required to put cotton in port, from a non-compress point, with compression enroute, are fully three times greater than for gin-compressed cotton, as shown by the table enclosed herewith.

"We appreciate, of course, that it is impossible to determine in the country the actual density of each shipment, as is done at the ports; and in order to avoid this necessity, and give the required inducement for high density and careful loading, we favor the issuance of a graduated carload rate. For instance, the present rate for a carload of 20,000 pounds, and one equitably less for a car-load of 40,000 pounds; and it seems to us that the changed conditions will necessitate this."

TABLE SHOWING DIFFERENCE IN CAR-DAYS REQUIRED TO PUT COTTON IN PORT BETWEEN ORDINARY COMPRESSED COTTON AND GIN COMPRESSED COTTON.

Flat Cotton.

4 cars to carry 100 B/C to compress, loading at gin, 1 day	4 car-day
4 cars, going to compress, 1 day	4 car-day
4 cars, switching in, unloading, etc., at compress, average time, 3 days	12 car-day
2 cars, carrying 100 B/C, compressed to port, average time, 2 days	4 car-day
2 cars, switching, unloading, etc., in port, average time, 4 days	8 car-day
Total	32 car-day

Gin Compressed Cotton.

1 car, loading at gin, 1 day	1 car-day
1 car, going to port, 2 days, (average)	2 car-day
1 car, unloading at port, etc., (average) 4 days	4 car-day
Total	7 car-day

C. T. Hanson, of the Gulf Compress Company, writes us from Memphis, Tenn., in regard to this decision of the Interstate Commerce Commission that, "the effect of this decision is to put all shippers of cotton on an identical basis. Looking at it from this point of view, I am unable to see a single defect in it. It is sound and equitable."

THE TEXTILE INDUSTRY IN NORTH CAROLINA.

The State Bureau of Labor and Printing of North Carolina, in its recent annual report, states that there are in that State 318 textile mills and 50 knitting mills, being about 98 per cent of the total number of mills in that commonwealth, showing an authorized capital of $41,278,160 and the employment of 2,588,114 spindles, 52,747 looms, 5,237 knitting machines, and 115,671 horsepower. There are dependent upon the mills for a livelihood fully 130,000 persons.

In response to the question with reference to children under twelve years of age working in factories, 84 per cent. of the manufacturers answered in the negative, 3 per cent. in the affirmative and 13 per cent. returned no answer. Fifty-eight per cent. favored compulsory education, 15 per cent. opposed, and 27 per cent. expressed no opinion on the subject.

The average number of hours constituting a day's work is ten and four-fifths.

The fifty knitting mills reporting this year show an aggregate authorized investment of $2,399,635. Total number of employees reported, 4,297.

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PICKENS MILL, PICKENS, S. C.

The Pickens mill is one of the latest cotton mills to be erected in the South, and although not of large size, represents the latest practice in cotton mill arrangement and design. The mill was started in June, 1906, and the machinery is now in operation and cloth is being produced. The mill plant is located on the railroad line running from Easley, S. C., to Pickens, and its facilities both for receiving and shipping are of the best. The mill buildings consist of a three-story manufacturing building with attached engine room, boiler house and pump house. In line with the main building, but separated from it by about 100 feet, is the cotton warehouse. In front of the main building is located the office building. The dimensions of the main mill are 266x105 feet. The boiler house is so placed that coal may be delivered to it by a spur track from the main line.

THE PICKENS MILL, PICKENS, S. C.

The general arrangement of the manufacturing departments is as follows: The picking, carding and roving departments are placed in the first story of the mill. The weaving department in the second story and spinning, spooling, warping and slashing departments in the third story. This arrangement has been found to be most convenient, and the manufacturing operations are carried on with a minimum of labor cost due to the small amount of handling of stock in process which is obtained by this arrangement of the departments. The mill is planned for an equipment of 15,120 ring spindles and 432-40-inch looms, and produces four-yard sheetings from 18s warp and 22s filling.

The picking machinery was furnished by the Kitson Machine Shop, Lowell, Mass. The carding, drawing and roving machinery was furnished by the Saco & Pettee Machine Shops, Newton Upper Falls, Mass. The spinning machinery by the Mason Machine Works, Taunton, Mass. The spoolers, warpers, and looms by the Draper Company, Hopedale, Mass., the looms being of the Northrop automatic type. The slashers were furnished by the Lowell Machine Shop, Lowell, Mass., and the cloth room machinery by the Curtis & Marble Machine Company, Worcester, Mass., through their Southern agent, A. H. Washburn, Charlotte, N. C.

Particular attention has been paid to the matter of water supply and fire protection for this plant, and this is one of the important features entering into the design of the cotton mill of today. In this particular instance a small stream or branch which runs through the property was dammed and the water pumped from the small pond thus formed to a large reservoir located immediately back of the cotton house and near the boiler house. This reservoir has a capacity of nearly two and a half millions gallons, and the water thus impounded used for fire protection purposes and for condensing water as well. A triplex motor-driven pump was installed at the small pond for the purpose of raising the water to the upper reservoir and has been found to work very satisfactorily. A standard "underwriter" fire pump of 1,000 gallon capacity furnishes one of the two supplies for the sprinkler and hydrant system, the other supply being a large elevated tank of 60,000 gallons capacity. The sprinkler system which is in exact

accordance with the requirements of the New England Mutual Insurance Companies, was installed by the Southern branch of the General Fire Extinguisher Company, and is complete in all respects, covering as it does the entire mill building, engine house, and boiler house and the cotton storehouse.

The shafting equipment was furnished by the Jones & Laughlin Steel Company, of Pittsburgh. The power plant which includes a cross compound Cooper-Corliss engine, was installed by the C. & G. Cooper Company, Mt. Vernon, O.

Wm. M. Hagood, of Easley, S. C., is the president and treasurer of this mill, and was instrumental in organizing it and carrying it through to its present complete state. Mr. Hagood is also president and treasurer of the Glenwood Cotton Mills, Easley, S. C., one of the new and successful mills of this section of the State.

The engineers for the plant were Lockwood, Greene & Company, Boston, Mass., and Greenville, S. C., and the work was carried on from their designs and under their supervision.

INVENTION AND THE TEXTILE INDUSTRY.

Little Accuracy in Popular Idea of What a Patent Is.—A Patent is the Grant of an Exclusive Right to Make, Use and Sell.—Mere Ideas and Principles are Not Patentable.

BY ROBERT C. CHILD,
Patent Expert in Textiles.

Industries do not remain stationary, and the industrial population itself is as vitally concerned in noting what change there is in a progressive change for the better as are the people at large. Modern conditions demand above all things efficiency in men and in their locations. Competition is fierce and active, and the hindmost do not long survive. Out of the heart of the fight, nevertheless, individual rights and the orderly growth of the industrial arts must be concerned.

In this country, as we all know, it has been recognized from the beginning that the improvement in the mechanic and liberal arts is of supreme importance. The founders of our government answered the need for stimulation of that improvement by the creation of the power in the general government to grant patents, writing it into the Constitution: "The Congress shall have power * * * to promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries."

It cannot be too often reiterated that the free exercise of the right here granted has done more than any other one thing to ameliorate the hard conditions of life. Nevertheless, as in all other matters of generally diffused knowledge, there is little accuracy in the popular idea of what a patent is, of what it grants and wherein lies its value. The whole subject is too much joined, even in the minds of even the very well informed, and in the ranks of such an industry as the textile manufacture, with the more recondite questions of law, which no one need know until it is forced upon him to learn, often at his cost. This is the stronger in view of the accessible nature of necessary information about so important a thing, and must be the excuse for briefly stating here some of the fundamental facts about a patent, before suggesting a more general use of the patent system than even the present large and intelligent activity in it of textile workers now indicates.

A patent, then, is the grant of an exclusive right or monopoly to make, use and sell a particular invention for a "limited time,"—seventeen years. It can be granted only to the original and first inventor or creator of the invention, or to his executor or administrator if he be dead, or his guardian, if insane. The right to the patent can be assigned by the inventor to another by an instrument in writing, like other valuable property, but he must apply for it himself.

There are four kinds of inventions recognized by the law: First, machines; second, articles of manufacture; third, arts or processes; and fourth, compositions of matter. Mere ideas or principles, or mere scientific laws, or wisdom or knowledge, or acquired skill, no matter how brilliant the mental effort which creates it, cannot be the basis for a patent. A new way of doing business, or of singing, or of growing potatoes, or of solving mathematical problems, may be a valuable invention, but it is not patentable. A machine may be anything from a pair of pliers to a spinning-mule or a steamboat; an article of manufacture is any useful or salable thing having a definable structure, which is not an unaltered product of nature or a machine or a composition of matter—which latter may be a mixture or a chemical compound, or even a mere association of materials. Tin cans, hats, woven fabrics, and nails, for instance, are articles of manufacture; soap and blacking and illuminating gas are compositions of matter. An art or process is the mode or manner of performing upon things or materials to reduce them to a different or improved state; it presupposes a series of actual steps or acts, doing which will produce a useful material result.

A patent is granted to any person who has invented one of these only when the device is new and useful. It is not new if it has ever been patented in this country or abroad before its invention, or if it has been patented abroad to the inventor, or his representatives, or an application made more than a year before his application here. Nor is it new if it has been in public use here for more than two years before the application is filed, nor if it should ever have been known or used by others in this country before the date of the invention, nor if it has been described in a printed publication either here or abroad for more than two years before the application is filed. In other words, it must be an original invention of the person who applies for a patent; he must not wait too long before applying for his patent after putting his invention to public use, for it will then have become public property; while description in a publication is as effective a bar to his exclusive rights as public use, or as a prior patent or the prior knowledge of others.

As between two or more conflicting or interfering claimants for a grant to monopoly in the same thing, the first inventor is entitled to the patent; if each of them has been diligent, after conceiving the invention to reduce it to practice, the one who first conceives is the first inventor; but in general, who first reduces his invention to practice is entitled to the right to it, and unreasonable delay in rendering the invention practical or filing an application for patent on it will defeat that right.

The device is not useful if it is inoperative, and it is in-

Right out at this work the writer took charge of another operative if it cannot be made to work without changing or adding to the inventor's mechanism or materials or the steps of his process. How well it works is not vital, if it works at all. Nor is the invention useful if it is contrary to public morals, or has no purpose but to aid in fraud or wrong doing. A patent, for instance, granted upon a burglar's tool, as such, would not be valid, if the device had no more peaceful and proper utility.

A thing may be both new and useful, and still be unpatentable if its creation did not require invention. The inventor is charged with knowledge of all that has been done in his art, at any time or anywhere in the world, which could reasonably have become known to anyone in this country, and he is equally charged with knowledge of and skill in all related arts bearing upon his invention. It will not avail him merely to have used that knowledge or skill in carrying forward an old idea, or making use in his own art of an old device from an analogous art. A new train of gearing for a clock would not make the clock patentable if the same gears were old in a watch. It is highly probable, however, that if it were old in an automobile or a threshing-machine, it would require invention to use it in a clock, and the clock would be patentable.

(To be Continued.)

THE LABOR PROBLEM IN THE SOUTH.

From Period of Abundance of Help in 1890-95 to the Present Period of Scarcity.—The Migratory Habit of Families.

BY A MILL SUPERINTENDENT.

Of all the problems before the South in general and the textile industry in particular, probably the most important and interesting, as well as the most widely discussed, is that of obtaining and controlling labor.

Beginning back in the years 1890 to '95, when the cotton milling industry was taking on new life, when new mills were going up at every small town and village, the question of an adequate supply of labor necessary to control and operate all departments of a mill, was given little consideration, except to widely herald the great benefit of being able to give employment to all their people.

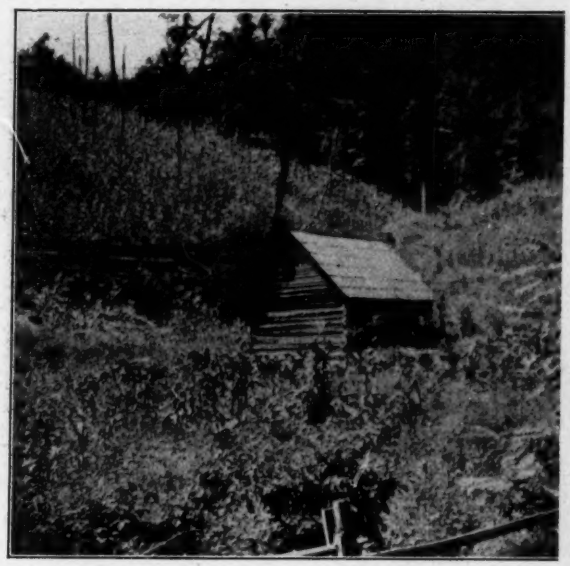
Through all the land there were thousands of steady and sturdy small farmers and their families, men whose lives had been spent at hard work on farms which they did not own, and owing to the trifling value of all farm products, there was no probability or likelihood of their ever owning them.

If a mill was built, the first families in the immediate country surrounding it, applied for work and were accepted, and only the small task of breaking them in with the aid of a few families of skilled operatives from other places, was before the management. At that time the organization of a cotton mill in any community where none existed, was hailed with great enthusiasm by the local paper, and everybody except the wealthiest real estate owners took stock, (the men usually the most benefitted,) though in the majority of cases the large class of small stockholders soon sold out, leaving the ownership in the hands of a few of the most progressive citizens.

In those days we frequently heard and read the expression, in the enumeration of the many blessings following the new plant, "giving employment to so many operatives."

Where one or two small mills were built, in comparatively isolated villages, the labor problem has never been so acute as in the mill centers. In every community there are a certain number of families, varying somewhat with conditions, available for just such employment as a cotton mill affords, and families native to the country, who make the best operatives, and will stay there. The best of these families will be represented in such a mill for generations, unless other mills are built at, or near the same place, and then begins the changing, infrequently and at long intervals at first; but with some of them, with increasing regularity and for slight provocation as the habit develops.

The writer has started up two new mills at different times in different localities and under widely varying conditions. The first was a small mill in a country where none existed. Though the mill was small, the fact that coarse work was done made the number of operatives considerable. With just two families of trained mill help and one young man for assistant overseer in the spinning room as a nucleus, the start was made, and in a surprisingly short time the mill was turning out its full production at a good quality.



The Mountain Home of a Native Factory Operative.

Of course, a liberal amount of patience was required, but a willing worker though unskilled, is vastly to be preferred to the careless man or woman however trained or skillful.

In the three and a half years the writer was employed at this mill, he remembers only three families who moved away—one of the original trained help, one regular mill family, who were employed a year or so after beginning operation, and one small family who went back to the farm. There may have been others, though the changes were so seldom and insignificant no others are recalled at this time.

At no time, however, was there any great surplus, in fact there was probably not a time when the application of a good hand or family would have been turned down.

In those days, however, when a full complement of mill help was obtained and trained, little effort was made to increase the number, as almost every name on the pay roll could be counted on to be represented when the whistle blew for work.

mill under construction, about five times as large, and in a mill center. Here the practice of hiring large families fresh from the country was soon lost sight of, and except a very few who had quit the older plants for one cause or another, the sole dependence was in enticing trained help from other mills.

And here is where the trouble begins. Like people of all other occupations and classes, we have people of all sorts of dispositions to deal with in this business. Only a few of the best known type will be dealt with in this narrative.

First in this new plant comes along a couple of the "tin bucket toters" of a neighboring mill, to make arrangements for their families. It is perfectly well known that they will be with us but a short time, but help must be had, the president is out once or twice a day impressing us with the importance of getting under way, so good and bad alike are

NATIVE TEXTILE MILL OPERATIVES.

employed as the opportunity offers.

Then comes the fellow who has a boy or girl who wants to change to some other department in the mill where they are at work, and as this cannot always be done without relinquishing the good order and discipline so necessary to the management of a plant, the easiest way out of it is to move over to the neighboring town and get employment there.

The next in order is the man who has fallen out with the superintendent or some of the department overseers, or it may be with his neighbor next door, and he is employed. From each of these, and many from different mills, the names of others are obtained, mostly the disgruntled or dissatisfied, all of whom are written to. A great many of these people will show some degree of business sense and will only change on being shown some advantage over their present conditions, though frequently a very slight difference in favor of a change will be remembered, and at the first favorable (?) opportunity, that is, when an overseer has reprimanded one of the children for some dereliction of duty, a "notice" is put in, and soon we have this family with us.

Before we have gotten around in employing the never ending variety, however, one of the first families hired has discovered that the water is making its members all sick, and to avoid a wholesale epidemic of fever, or some other dreadful disease, the head of it determines to move, dragging with him what little plunder he possesses in the way of household furniture that has not been worn out or generally broken up. He will vrobably move to a mill one or two hundred feet lower in altitude, but no notice is taken of this, and anything for a change is all right for a while.

In this mill, one family, whose case is rather the extreme let it be said, is particularly recalled. The head of the family wrote from a town about one hundred miles away, giving the usual description of his "help," detailing what they could do in mill work, and informing us that he "had heard we needed hands," the usual preliminary in such letters to all mills. Transportation was promptly furnished to the members, and in due time they arrived. The man showed up at the office as soon as he arrived on the grounds, presenting a list of things he required before housekeeping could be proceeded with. First, he said the railroad people had entirely demolished his cooking stove, so he had to have a new one. Then a full line of groceries and some furniture was added, so by the time he and his family were settled, he was indebted to the mill for transportation and supplies something like fifty or seventy-five dollars. It soon developed that the head of the house was afflicted with the disease, which for want of a better name will be called "anti-work." Realizing the considerable volume of his indebtedness and the liability of losing a part of it, this man was sent for several times, and offered such work as was thought would be suited to him, but to all such invitations he explained that the "dust" in the mill was fatal to him, while a "hurting in the breast" (where is the cotton mill

man who has not heard this expression a thousand times?) prevented his doing any manual labor.

For fear of being tiresome to the reader the history of this family will not be recounted much further, but before leaving its head, let it be told, in the following two years, moved away and returned at least five times, costing his family from twenty to fifty dollars at each move. For some unaccountable reason, he finally came back and settled down at this mill, and if I mistake not, is there today.

The writer does not wish to convey the idea to the uninitiated that any considerable number of the mill people are of this class, for such is not the case, but there are enough of them to keep the management of the mill eternally guessing as to how his labor supply will be from week to week. The fact that work is plentiful and wages good, which should be an incentive to improve conditions, is to some of the people a positive disadvantage.

As referred to in the first of this, a few years ago when something like reasonable discipline was maintained in all or most of the mills, practically full time was made by all employed except in cases of actual illness.

As holding a job becomes easier, triflingness and worthlessness are encouraged, and instead of applying the increased earning capacity to better living and more comfortable surroundings, only work enough is done to supply the bare necessities of life.

Let it be said here that the writer recognizes that the mill managers and superintendents are responsible for most of these evils, and though it is not clear how all of them could be avoided, some could.

Every mill that goes up, is in a hurry to get started, and after the superintendent is appointed or elected, he is duly impressed with this fact.

The patience and expense necessary to obtain help from the remote rural districts are rarely exercised to any great extent, as decidedly the quickest and cheapest way is to get help from other mills, and the fact that this increases competition and is keeping up trouble for the future, is lost sight of. The system of trading in each other's help, indulged in by all mills, adds not one family or single operative to the total supply, but intensifies the ever increasing labor problem.

ADVERTISING TEXTILES TO THE CONSUMER.

No Manufacturer Should Allow His Product to be Marketed Unidentified and Unknown. The Consumer is a Factor to be Considered and Reckoned With.

Written especially for COTTON by Stanley R. Latshaw, of The Ladies Home Journal.

The greatest development in the cotton manufacturer's field is just starting. It behooves every man who is in control of the policy of a mill to appreciate this change and to meet and recognize the great power that is effecting the change.

I am going to ask you to discuss this question in its broadest sense and widest application first. The details and methods and plans will follow naturally, if you want them. But first let us consider the reasons for this new condition, and speculate as to its growth. And then if you want to make it a matter of individual application, well and good.

In the whole textile field, the cotton industry is probably the finest and most cleanly developed. Manufacturers are of the highest type of constructive genius. Their capital invested is large and their interests cover a wide range. The cotton manufacturer is very often the controlling destiny in the lives of a little city. He looks after the welfare, health and education of his mill hands and their families. Not only must he be possessed of executive ability of the first order to manage his own private interests, but in the majority of cases he must be largely concerned in civic affairs and in the broadest policies of national administration. And this man possessed of great ability, as he must be, has put his mind and effort on the building of a great property, the reduction of factory cost, the improvement in the quality and quantity of his output.

Let some one bring out a new loom or improve an old one, and there is no one quicker to seize the advantage than the cotton manufacturer. He prides himself on his folding and rolling by machine, while England, with nearly twice the output, still performs this work by hand. Not content with his position on the water power streams of New England, he moves South, right next the field from whence he draws his raw material. He knows all this, he recognizes its verity, and yet this same manufacturer delegates the marketing of his product to others. Because of the ridiculous length of the credits extended, the average manufacturer needs capital and the commission house provides it. Now no one quarrels with the existence of the commission house. In very many cases they eventually own the mills. But answer me this:

What other great industry is there that allows its product to go out year after year unidentified and unknown? There is some reason for one having a product to sell. Something in which it differs, some way in which it fulfills weave—it has some quality which serves as a reason for its its function better than anything else. Design, color, price, pose of it to a purchaser.

Now just why the cotton textile manufacturer has allowed the great separation between manufacturing and selling to occur, is peculiar. By some turn of the mind, he does not look on the purchasing public with the same eye and perspective that the men of other industries are accustomed to view the field. A textile man will tell you that his brand is known to the jobbers and big buyers the country over, and when you ask him of the consumer, he scoffs.

One reckons cotton by the number of pieces or the number of cases. And when I speak of yards and cite the case of some woman who purchases a dress pattern, you smile indulgently, really it is too trivial to even think of, but is it?

Last year the cotton men of this country manufactured over 5,000,000,000 square yards of fabric. There are in this country about 83,000,000 people, and the government census shows about five to a home, so that 16,600,000 homes took the bulk of the total output.

The manufacturer should always think of the unit—the home—five people to clothe and supply. Ever since the time when "Adam delved and Eve spun," the woman of the household has been the textile buyer. And whether from the potentiality of the particular rib used in Eve's

evolution, or because of her finer nature and better appreciation of the best in life, woman has been devoted to dress.

Nothing in life, after the husband and family, is of the vital importance as cloths. Nothing is so general and so sustained as a topic of conversation, nothing is so prolific of extravagance, envy, heartburn or joy as clothes to a woman. Nothing will so quickly catch her attention and rivet her thought as a dress pattern or a hint on the use of a new fabric. No one can successfully combat this statement of the wonderful opportunity that awaits the cotton manufacturer. And yet this is an unadvertised industry. You manufacture a piece of goods that pleases, that satisfies, that makes a friend. How is that friend—the woman—to tell her friends of your goods? How can she be sure of getting your goods again, even in the same store?

And suppose you make a better article and get a better margin of profit, as you should, what chance have you against the merchant who does not desire to push your goods; or worse, against him who leaves them untouched under the counter?

Women are shoppers and women are bargain hunters. If a woman wants your goods, she will go from store to store in search of them. This is a fact, and a fact of such vital importance that makes your industry the most wonderfully profitable field in the world for the one who advertises.

If you make good goods, put your name on them, and tell the women that they are good goods and why, the women will try them. They are used to buying advertised articles and prefer to do so rather than experiment with unknown cottons made by they know not who, and unrecommended by any one save the clerk. Nearly all of the great national advertising mediums guarantee everything that they admit to their advertising columns. Your advertisement then is your announcement, your introduction, and a trial of your product is assured.

What reason is there for allowing the superiority of your goods to go unrecognized? Of course, to an extent this is not true, but if you have a product that "makes good" after the advertising has secured its trial, your position is safe. When cotton advances sharply, you cannot make an immediate and proportional advance in your price. With an advertised brand you can.

I have four clients who have made an advance over the current increase in price, wholly and solely on the strength of their advertising, not that they felt the change, but, on the contrary, an apparent increase in buying resulted.

But an advance in price should not be made co-incident with the appearance of advertising. Establish a demand and your goods will move in answer to that demand, even though the margin of profit has been doubled.

A certain man, prominent in this field, says that "the first man who ate an oyster had nerve, but it does not require nerve today to eat an oyster." In like manner, in the textile field, the experiment has been made with the greatest success.

I have not the slightest desire to advance the argument that you should advertise your goods, simply because your competitor does, or intends so doing; and yet the business man places more reliance on results than on theories, and so in succeeding installments we shall follow the old pedagogic precept and "proceed from the known to the unknown."

(To be Continued.)

TRADE DISCOUNTS ON COTTON GOODS.

EFFECT UPON SOUTHERN MANUFACTURERS.

At a time when cotton goods manufacturers are inflated with the idea that their products can be merchandised without much effort on the part of agents, it is natural that a discussion of discounts and terms of sales should come up. While the market is active, there appeared to be no reason why prevailing discounts should not obtain.

A careful review of discounts in the dry goods trade has been furnished the New York *Commercial* by one of the veteran commission men of the trade, Laurus Loomis, of Catlin & Co., and it sheds light on the present situation. His letter is as follows:

"When I was a boy in the cotton goods commission house of George W. Powers & Co., New York City, the almost universal terms of sales of cotton goods was on four months, six months, and eight months. The commission house would then cash this paper or shave it, and the amount of discount or shave that the paper necessitated would be the basis of the sales of the goods to the buyer.

"The cotton mill was then paid cash or within thirty days. In other words, the better the purchaser's credit the lower he bought his goods, and the house that had a poor credit would have to pay a higher price for their goods. The late Horace B. Claflin, one of the princes of American merchants, deemed this system wrong and inaugurated another system of two per cent. off, cash, 10 days.

"This went on for a period of years until competition became stronger and 60 days was added to the 10 and this became generally accepted or, if it was discounted, three per cent. off, cash 10 days. And so, this system has gone all along with both Northern and Southern mills, and the Southern mills, in their desire for trade, were very glad to accede to the custom.

"Now, of course, goods are scarcer, but when we attempt to argue with the buyer about two per cent. off, instead of three off, there is a conflict at once—he regards the latter as an infringement on his proper terms. We really believe that it is best for all concerned to fall in with the general custom than try to 'face a regiment of soldiers with one man,' which is very difficult.

"Of course, this rule does not apply to fine goods or what are known as Eastern styles; it relates to Southern or coarse goods, and it is independent of the export trade, which is sometimes net, sometimes one off, sometimes two off, and sometimes three off, according to the condition of the market."

The excuse is often put forward by firms which neglect proper depreciation allowances, that they keep the machines repaired and in good working order from revenue.

A machine is a money-making appliance, either directly or indirectly; but it costs money to make, it costs money to run, and it costs money to repair.

Notices of mill projects, additions and improvements, in buildings and machinery, are solicited by COTTON.

COTTON MANUFACTURING.

COTTON MANUFACTURE.

Progressive Steps in the Processes From the Spinning to the Completed Product.

BY W. S. H.

(*Continued From August.*)

The various mechanical processes through which cotton passes from the seed to spinning were shown, diagrammatically, in the previous part of this article. We reproduce the diagram for the purpose of showing the progressive steps in manufacture, beginning with the spinning and ending with the finishing process.

15. *The Spinning Mule,* or intermittent system, which operates in periods. These may be referred to as (a) drawing and twisting, (b) backing-off, (c) winding on. The spun yarn is wound into cops.

16. *The Ring Spinning Frame,* or continuous system, which builds the yarn on to a bobbin.

The subsequent operations on the spun yarn depend on the branch of manufacture it is made for, and the diagram plan divides these into parts, which can be followed by the dotted lines. The first division represents the weaving of common cloths known as domestics, calicoes, etc. Yarn for weaving purposes is called "warp" or "twist," which forms the lengthway threads of the fabric; and "weft" or "filling" which forms the cross-threads put in by the passage of the shuttle. The weft usually requires no preparation in the weaving department; it is spun softer than the twist, as it is intended to give fullness to the cloth. The operations following, excepting, of course, the loom itself, must be understood to affect only the warp or twist threads.

17. *Upright Spindle Winding Frame.* This winds the yarn on to the bobbins suitable for the creel of warping machine.

18. *Beam Warping Machine.* This unwinds the bobbins side by side on to the beam or roller.

19. *Slasher Sizing Machine.* This covers the warp, in its passage from beam to beam with a "size," (soap, tallow, starch, etc.,) then dries by steam-heated cylinders.

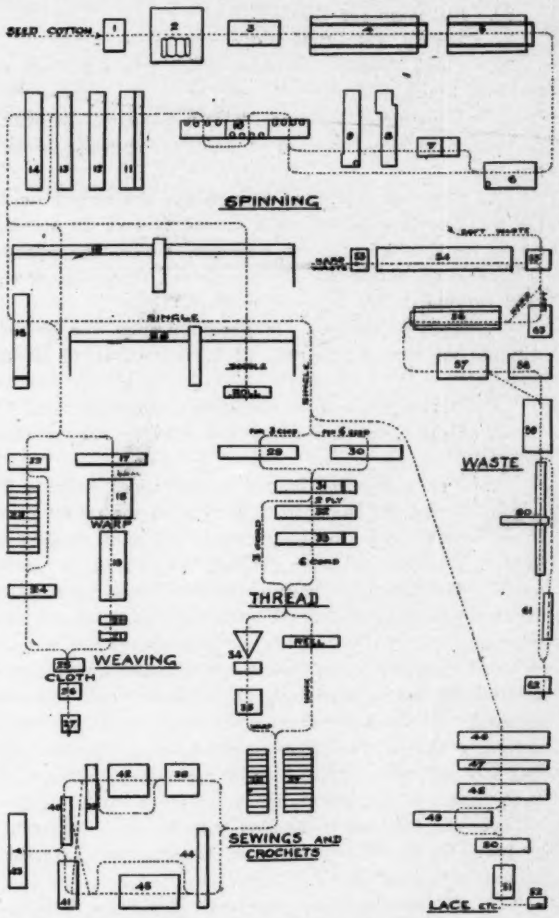
20 and 21. *Drawing-in and Twisting-in.* Manual operations, which consist in connecting the ends in the loom and threading the reels. (Dyed yarn is first reeled or warped, and weft is wound on pirns after dyeing. Nos. 22, 23 and 24.)

25. *The Loom.* The warp or lengthway threads pass from the thread beam behind, through the healds and reed, to the cloth beam in front, meantime being woven into a fabric by the "pick" of the shuttle (with a weft cop or pirn) backwards and forwards. The warp threads are lifted up alternately, and the picks are put in during the formation of each "shed" in turn.

Yarns made for thread are to be doubled and twisted, and twisting frames are of two types, intermittent and continuous, the first of which is called the twiner.

28. *The Twiner.* The twiner combines and twists cop yarns at one process, but it is little used as compared with the ring frame, and then only for certain classes of goods. The twiner builds in cops which are usually reeled or warped, and afterwards used in the gray, bleached, or dyed state for two-fold "manufacturings."

Sewings and crochet thread are generally twisted on the continuous type of machine, or "ring" twisting frame, but are first wound.



29. *Upright Spindle Winding Machine.* This is very similar to that used in weaving preparation, but here is intended for 3 cord sewings, whilst yarns intended for 6 cords are wound double, on

30. *The Drum Winding Frame,* which makes cross-wound spools and equalizes the tension in the combined threads, a necessity in good twisting.

31. *The Ring Twisting Frame.* This for 3 cord twists, three single ends together, and for 6 cords two single ends together, being in the latter case a "preparing" twisted only.

32. *Re-Winding Frame.* Winds the 2-ply without twisting, as before, into 6-fold spools or bobbins for 6 cords, which are thus ready for the finishing or final twisting frame.

33. *Finishing Twisting Frame,* used for the making of 6, 9, or other cords. The thread is said to be made when the last twisting has been performed on it, and the sub-

sequent operations depend on the finishng arrangements, some firms preferring to dye or bleach in "warp," and others in "hank." When warp-dyeing is adopted, the sewings are wound on to a "beam," by

34. *The Warping Machine,* in which 360 bobbins from the twisting frames are run off together on to a beam. The long warp of 360 threads is then

35. *Chained.* The warp being linked up into a chain, in which form it is convenient for passing through the bleaching or dyeing liquors.

36. *Bleaching for White.*

37. *Dyeing,* for black and colors.

38. *Chain Beaming Machine,* which puts the warp on to brass beams.

39. *Winding-off Machine.* This winds from the beams on to large bobbins, which are suitable for spooling or balling from.

40. *Spooling Machine.* This winds the thread on to the well-known wooden spools, or reels, nicks the flanges, places the thread in the slit, and cuts it off. The machine is capable of setting for any number of yards, the spools used varying in size accordingly.

41. *Balling Machine.* Is generally used for crochet, winding the thread into balls of various sizes and certain lengths.

If the sewings are to be "polished" instead of "soft finished" as above, the beams from the chain-beaming machine are taken to

42. *The Warp Polishing Machine,* which polishes the whole 360 ends at one time, and re-winds the thread on to brass beams ready for the winding off and spooling as before. In the polishing process, the thread is passed rapidly through liquid starch and wax, then polished by revolving brushes, and dried by contact with steam-heated rollers.

43. *Ticketing.* The spools are ticketed by automatic or semi-automatic machines, or by hand, and are then ready for the market. When dyed in the hank, the twisted thread is reeled, then after its examination for faults, is bundled and taken to the bleach or dyeworks, after which it is wound on to bobbins, in

44. *Hank Winding Machine,* which is fitted with swifts or races for the hanks and winds off these on to large bobbins or cones, as desired.

45. *Bobbin Polishing Machine.* For "glace" finish a polishing machine with bobbin creel and bobbin "bank" is used, but if for soft finish the polishing is of course left out and the thread proceeds as before to the spooling department.

Other goods in the thread trade include nettings, knittings, embroidery, lace and hosiery, and these require the use of several machines not yet enumerated.

46. *The Drum Winding Frame,* similar to No. 30, is used for almost every class of doubled thread and is followed by

47. *The Twisting Frame*—ring or flyer system, which makes the thread.

48. *Clearing Frame.* This may be described as a knot-catcher and clearer, and winds the yarn on to bobbins suitable for gassing.

49. *Gassing Frame.* In this the thread is rapidly passed through gas flames which burn off all the outside fibers that are not contributory to the strength.

50. *The Reel,* which "hanks" the thread, for several purposes.

51. *Preparing Machine.* This lusterizes and compresses the thread, and is used for both gassed and ungassed varieties.

52. *Bundling Press,* which makes the yarn up into bundles of 5 lbs. or 10 lbs. weight.

The waste cotton from the various spinning processes is used for spinning into coarse counts of yarn, from which cotton blankets and other thick goods of low quality are woven. Hard waste (waste consisting of twisted ends) is separated from soft waste (produced by combers and other card room machinery) and the treatment depends on the quality and cleanliness of the material. The following brief list gives the essential machines, and the diagram shows their sequence.

53. *Hard Waste Picker, or Waste Cleaner.*

54. *Six Cylinder Waste Machine,* which opens the material and destroys the twist.

55. *Willow or Opener.* This is the first process for "soft" waste.

56. *Single Scutcher.*

57. *Breaker Card.* This is fed by laps and delivers in cans, or in a flat sliver suitable for laying on the finisher card.

58. *Derby Doubler,* which makes two narrow laps.

59. *Finisher Card and Condenser.* The condensor makes a bobbin of 18 to 34 ends, which feed a corresponding number of spindles in the mule or billey.

60. *Billey,* or intermittent system spinning machine.

61. *Spinning Frame,* with flyers.

62. *Weaving Processes.*

63. *For Soft Waste, a One-Cylinder Waste Breaker* is introduced before scutching.

SOME PROPERTIES OF WOOL AND COTTON.

A COMPARISON.

BY HOWARD PRIESTMAN.

(*Concluded From August.*)

In addition to all that has already been said, there is one other circumstance which is of no small interest as regards the value of serrations in spinning. A comparison of cotton and wool at once makes it clear that serrations or scales on the outside of a fiber are not necessary to make that fiber spin. This is so far from being the case, that it is best proved by a comparison of fibers of each of the two materials, capable of spinning to a given size or count of thread. Every cotton fiber is well known to resemble a ribbon rather than a cylindrical fiber; but not only is cotton tape-like in section, but it is like a tape which has been twisted. Cotton is also entirely devoid of scales or of anything which has the nature of serrations. An American cotton of a quality such as is used to spin to an ordinary 40's yarn is probably capable of spinning to rather finer counts, but for the sake of argument we will consider that 40's is the limit. Forty hanks of 840 yards each are equal to 33,600 yards of thread in every pound, which is the exact equivalent of 60 worsted hanks of 560 yards. Wool of 60's quality and cotton of 40's quality are

therefore capable of being spun to the same degree of tenuity, and it is therefore reasonable to expect that they should be the same in length and diameter, or if one of the fibers possesses some property which is advantageous to spinning, the other should have some equivalent.

As considerable attention has already been paid to the various sizes, it will be simplest to begin a comparison by looking at the diameters of the two materials first. If the average diameters of the three wools coming respectively from the Cape, Buenos Ayres and Australia, are added together and again averaged, we find that they come out at slightly less than one thousandth of an inch in diameter, and all of them spin to 60's counts.

The smallest diameter of the American cotton already mentioned is 1/1500 of an inch, whilst its greatest breadth is 1/600. If we leave out all the ciphers from these fractions and multiply the length of any section by its breadth, we find that the relative area of the worsted is 1/10 x 1/10 which is equal to 1/100, whereas the cotton only shows 1/15 x 1/6, which is equal to 1/90. This makes the cotton 10 per cent. to the bad so far as sectional area is concerned, and on this head alone it should therefore spin 10 per cent. worse than wool.

As yet no one has ever dared to estimate the *proportionate* value of scales or serrations in the spinning power of wool, and it is therefore quite impossible to estimate what percentage of spinning power cotton ought to lose from being absolutely smooth, for its surface is much like that of a glass rod with no serrations or scales of any sort upon it.

There is one other property which wool must possess if it is to spin at all. That property is the necessary length. Length is a purely relative term in the worsted trade, for everyone knows that what would be excessive length in 80's quality would be so short in 40's that wool of the right diameter would not spin to half the normal counts. In other words, if the longest fibers in a 40's quality were only 4½ inches in length it would not spin to 20's, under present conditions. All tops, or combed wool, contain fibers of varying lengths. In 60's qualities the longest fibers will be 4 inches long, and associated with them there will be other fibers in proportionate quantities of 3½, 3, 2½ inches, as well as a few two-inch hairs; this will give an average of say three inches of length for a good 60's Australian wool. Now let us look at cotton. As it is 10 per cent to the bad in spinning power on account of its diameter, and as it has no serrations, it ought to be proportionately longer than wool which will spin to the same counts, but instead of this we find that it is very much the shorter of the two materials. One and a half inches is probably an extreme length for the longest fibers in the quality in question, and the average length of the cotton is not likely to exceed 1¼ inches. In order to be absolutely on the safe side, let us say that the wool is twice the length of the cotton, from which fact it ought to be safe to conclude that it would spin to counts twice as fine, not taking serrations into consideration. This would mean that all Australian wool with fibres 1/1000 of an inch in diameter and three inches in length ought to spin to 120 counts, but this is far from being the case. Such a conclusion as this is, of course, what Euclid calls a reductio ad absurdum, but unlike Euclid's propositions of that kind, our proposition is based on established facts.

The conclusion naturally drives us to ask what property does cotton possess which makes it spin so well. Cotton men always say that it is the twisted or spiral nature of the fiber which gives it its great spinning value. The round structure of wool naturally precludes the same possibility of spiral twisting, but in order that this paper may not be wholly critical, it is well that we should now consider if the wool may not possess some property which is equivalent to the twist in the cotton fiber. As there is no other peculiarity which is visible under the microscope, it is necessary to look for something on a rather larger scale than the serrations. In the writer's opinion there are two things which it is necessary to consider. In the first place it is of course absolutely essential that wool should be sound, which means that it must possess a certain combination of elasticity and strength. This property depends, of course, on many things, the first of which is the breed of the sheep; but the best sheep may produce inferior wool if their surroundings and food are unsuitable. For example, when sheep are starved during a drought it may easily happen that the short length of wool which grows over all parts of the fleece during that time may be quite weak, whilst every fiber which has grown before the drought and that part which comes afterwards may both be quite sound. In such a case every staple in the fleece and every sheep in a large flock, or even in a large district, may be affected in the same way. All the wool will have a soft or tender place in it at some part of its length, and as a test for strength is the very first thing which a buyer applies to wool. Wool is quite certain to be rejected if it has been "pined" (to use the Yorkshire expression) for however short a time during its growth.

The one property of wool which has not yet been mentioned, which is likely to take the place of the twist in cotton is its waviness. The finer and better grown wool is, the more pronounced is its "crimp" or waviness, and as a rule the more the waviness the better will the wool spin. This fact has long been known to veteran wool buyers. It naturally gives elasticity to the staple, for the wool tends always to lie not in a straight line, but in a line which may have as many as forty waves per inch. In greasy wool the curves are often more than half a circle, and when this is the case a staple which is apparently only 1½ inches in length may be pulled out without actually stretching the fiber, to three inches or even more.

If the line of reasoning already adopted, can be relied on, it is clear that when serrations and waviness of wool are taken together, they are not equal to the twist in cotton fiber, as an aid to spinning, for with equivalent diameter and double the length wool certainly spins no better than cotton.

Unfortunately there are not sufficient data available at present to estimate the value of "crimp," for its value could only be ascertained by practical experiment on a large scale, and few owners of material and machinery think it worth while to spend time and money in the solution of abstract problems.

There can be no doubt that the problem ought to be solved; for if a wider knowledge were brought to bear on the properties of wool, there seems to be no reason why it

should not be spun to counts more nearly in proportion to its length as compared with cotton.

HIGHLY COLORED DRESS PLAIDS.

A POPULAR FABRIC FOR WOMEN AND CHILDREN.

BY EMIL KAHN.

This style of dress goods originated with the formation of the Scottish Clans, but its popularity has been retained notwithstanding the decline in the potency of these clans. A study of the various plaids made by these people, will reveal color combinations and arrangements carried out to perfection.

The plaided fabric was the only style of fabric worn by the Scots. However, each clan had its own color combinations and patterns peculiar to itself, and these different patterns were named after the chief of the clan, by which name they are still known.

Each clan had several styles and colorings of plaids and these different styles were used for different occasions, as, for instance, one style was used for dress occasions, another was worn when hunting, still another would be worn when in mourning.

These fabrics were usually made of wool, and woven on hand looms. The production under these conditions was necessarily limited, and, in consequence, these fabrics were entirely confined to home use, with rare exception.

In this article our object is to describe three grades of plaided dress fabrics, evolved from the Scottish plaid, but made of cheaper material and somewhat different in weave. With the cheaper grade economy in the cost of production is a highly important consideration. The quality of goods herein considered may for convenience be divided into three distinct grades, viz., A, B and C. The difference between these three grades lies principally in the quality of the fabric and the weaves. The pattern or color arrangement may be alike.

FABRIC A.

Under grade A are two fabrics with a similar construction. No. 1 fabric is 38½ inches in the reed, 1,000 reed, to finish at 36 inches.

Warp 2/40's cotton ground warp, and 2/40's mercerized cotton raised stripe.

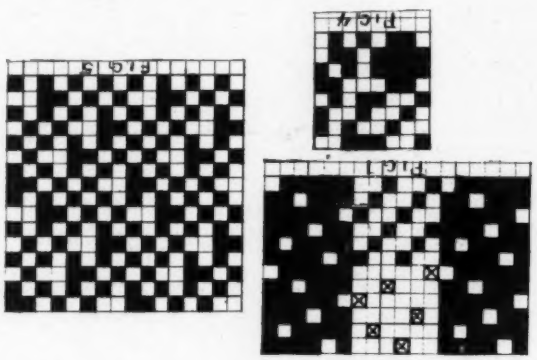
Filling, 1/32's worsted and 2/40's mercerized cotton, 56 picks and stop take up.

No. 2 fabric in same grade has similar construction, with the exception that filling is composed entirely of mercerized cotton, 2/40's.

In these two fabrics we deal with a raised satin stripe; this stripe is in both warp and filling, giving additional ornamentation to the fabric. The ground weave is a $\frac{1}{2}$ twill, this weave being preferred whenever the quality of filling is better than the warp. The raised stripe used is a six end irregular satin weave, $\frac{5}{1}$.

In order that these two weaves bind properly,—that is a raiser in the ground weave shall be alongside a sinker in the satin weave,—a given number of ends must be decided upon when laying out the pattern. The number of ends necessary to give perfect stitching must be a number that is divisible by the repeat of the satin weave, or six ends. A perfectly stitched fabric will present a better appearance and also wear more satisfactorily. The common practice is to place the satin stripe in the pattern at given spaces in series of six ends or one repeat of its weave, the number of ground ends between two of these stripes must be a number that will divide equally by six, otherwise imperfect binding will result. This applies equally as well to the filling. (See Fig. 1), which shows two repeats of satin warp stripe, and how ground weave and filling satin stripe stitch with it on both sides.

Being compelled to confine ourselves to patterns in which the number of ends between the stripes are divisible by six, if we use the six end satin weave, we are likely to experience some little difficulty in laying out the pattern, especially so if even sided patterns are desired, and consist of varied color arrangements and placed in groups of from two to eight ends.



The patterns, however, have in connection with this grouping large blocks of color between the satin stripes; therefore, if any portion of the pattern between the stripes fails to divide evenly by six, two ends may be added to or taken from the large block without any injury to the pattern.

With the weaves in question we need not necessarily confine ourselves to a stripe of six ends, on the contrary we may double up, that is, have two, three or more repeats of the satin weave, forming one stripe, as, for example, one stripe of six ends, another of twelve ends, still another of eighteen ends, or as many as may be desired, in both warp and filling.

If, however, six ends are not desirable, we may have a stripe of only four ends, in which case we use the first, second, fourth and fifth ends of the six-end satin weave, and add two ends to the ground; that is, instead of having even sixes, have two ends over the even sixes in the ground.

See Fig. 2, between the satin filling stripe; also see drawing-in draft, Fig. 3, showing on what harness to draw the two ends.

The 4-end arrangement will give perfect binding the same as using the 6-end stripe.

WARPING PLAN.

102—2—Red *o*
2—Blue *o*
4—Red

2—Red
2—Blue
6—Blue
6—Red
6—Blue
8—12—Black mercerized satin stripe *x o*
48—Blue 1
2— 4—Green mercerized satin stripe *x o*
26—Blue
2— 4—Yellow mercerized satin stripe *x o*
50—Blue 2
8—12 Black mercerized cotton stripe *x o*

246 258

It may be stated that 246 is obtained by counting only the actual reed space that the pattern occupies. For example, the twelve ends marked 8-12 indicate that the twelve ends only take the place of 8 ends,—4 dents,—because they are reeded three ends in one dent. When, however, there are only 4 ends or stripe, these four ends are reeded in one dent, (2-4). Consequently, these four ends only take the place of two ends in the reed or one dent.

o shows the four colors used in the filling. Use yellow for green in filling.

x draw tight during beaming.

1. Start the pattern.
2. End the pattern.

The ground warp is reeded two in one dent.

In weaving, the take-up or pick wheel stops every alternate pick when weaving in the satin stripe.

ENDS FOR PATTERN. 38½ INCHES IN REED.

1532—Blue	176 2/40
400—Red	50 2/40
192—Black *x*	24 2/40
36—Green *x*	4 2/40
36—Yellow *x*	4 2/40
60—Black-selvage	0 2/40
2256	258

x draw tight during beaming.

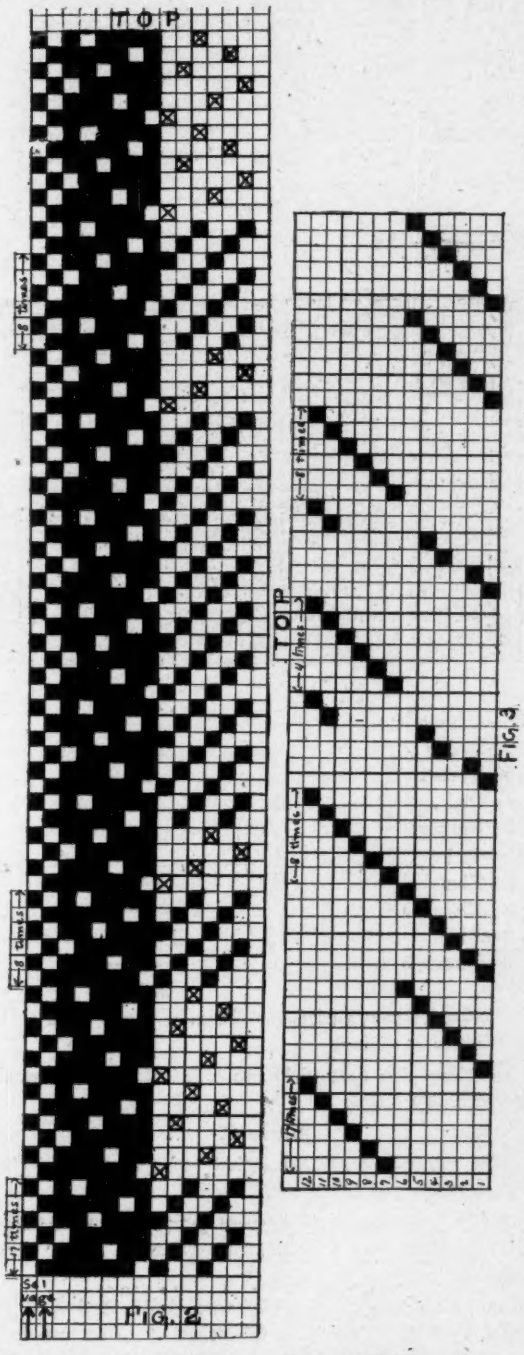
The color arrangement and grouping for these fabrics are arranged in almost every conceivable manner. In laying out new patterns it would be advisable to study the arrangement of the old Scotch plaids. In the particular grade of fabrics under consideration, effectiveness of color arrangement is much to be desired. Some patterns have a liberal number of colors in the warp, eight and ten colors are common, while the number of colors in the filling depends largely upon the kind of loom available.

Four to seven colors in the filling are made to cover eight to ten colors in the warp. In instances of this kind some discretion must be brought into play in using the limited number of fillings to cover the warp in such a manner that the lack of colorings be least noticeable.

The variety of patterns the designer is compelled to deal with, makes it impossible to give any definite rule, he must be guided entirely by his judgment in regard to which colors may be used for filling.

It cannot be denied that the pattern is more artistic if color crosses color. However, some striking effects are obtained with seven or more colors in the warp and only four colors in the filling.

New groupings and color schemes are always in demand. We suggest that the student procure a piece of reed, say 12 to 18 inches long, and a number of short lengths of colored yarn, then reed from these yarns a pattern. A fair idea may be obtained how the pattern will appear in the woven fabric, and also what colors could with least detriment to the pattern be dispensed with in the filling, if the loom



available cannot properly cover the warp colors.

FABRIC B.

Width of warp in reed 33½ inches to finish at 32 inches, 1,000 reed, 54 picks per inch.

Ground warp 1/20's cotton; stripe warp 2/40's cotton; filling 1/32's worsted.

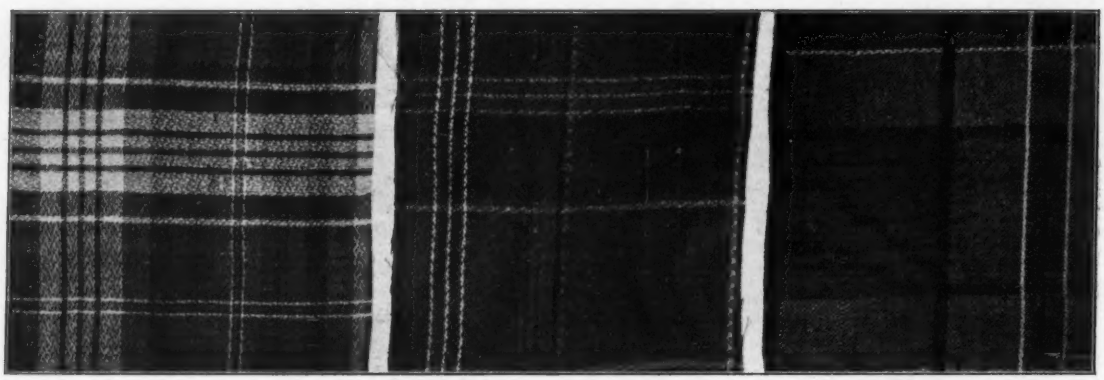
The weave for this fabric is operated on eight harnesses, four harnesses for ground weave, and four for the fancy stripe.

The ground weave is drawn as follows—1, 2, 3, 4, 2, 1, 4 and 3. The stripe is composed of six ends, drawn in on the back four harnesses—5, 6, 7 and 8, with two ends each in heddles 6 and 7, and is reeded three ends in one dent.

The patterns are similar to the ones in fabric A, the number of ends between the fancy stripe should be divisible by four, in order to bind properly with the stripe. The stripe weave, however, is only in the warp way of the fabric, see Fig. 4.

WARPING PLAN.

108—Blue *x*	8—Blue
4—6—Yellow *x*	2—Bleach
16—Bleach *x*	12—Red
4—Blue *x*	2—Bleach
8—Bleach	2—Blue
4—Red *x*	2—Red
8—Bleach	2—Blue
4—Blue	2—Bleach
16—Bleach	12—Red
20—Blue	12—Green
4—Yellow *o*	2—Black
12—Blue	4—Green
12—Green *x*	2—Black
2—Blue	12—Green
4—Green	12—Blue
2—Blue	4—Yellow *o*
12—Green	20—Blue
	230



SCOTISH PLAIDS.

36—Garnet *x*	2—Blue
2—Red *x*	38—Garnet
6—Garnet	2—Red
4—Red	4—Garnet
2—Garnet	4—Red
10—Red	2—Garnet
2—Blue	12—Red
2—Bleach *o*	4—Blue
8—Blue	4—6—Green stripe.
2—Bleach *o*	
268	272

x indicates colors used for filling.

o yellow in filling.

In filling plan four picks are sufficient to cover the six ends of fancy stripe.

FABRIC C.

This fabric is composed entirely of cotton yarn 1/26's in both warp and filling.

The weave is an eight harness granite, drawn straight, and is without any special stripe weave in either warp or filling.

The construction is as follows:—1,200 reed *x* 2, 30 inches in reed, to finish at 28 inches, 60 picks per inch.

The color scheme for this fabric is usually more elaborate than with former two fabrics, brighter colors are preferred, and the patterns are less massive, that is, the pattern is broken up into groupings of fewer ends.

x indicates filling colors.

o bleach in filling.

These fabrics require very little finishing. Running through a rotary press between heated cylinders and slightly steamed, is all that is required.

It is particularly important that the growers of Sea Island cotton should begin at once to practice diversification in order to gain experience with other crops, because there is a possibility that the invasion of the boll weevil into the eastern States may in a few years make Sea Island cotton an unprofitable crop.

Notices of mill projects, additions and improvements, in buildings and machinery, are solicited by COTTON.

The admixture of weak and stained cotton means loss to the spinner from waste and the extra cost of cleaning, and this loss must be made good by a reduction in the price paid the farmer.

The cultivation of cowpeas, velvet beans, and other legumes adds to the soil large quantities of nitrogen drawn from the air, enabling the cotton planter to secure at slight expense an element which is the most costly part of purchased fertilizers.

Send notices of Overseer changes to COTTON.

KNITTING.

THE SINKER MECHANISM IN KNITTING MACHINES.

BY ROBERT C. CHILD.

To form a knit fabric by the aid of machinery it is necessary first to form a row of loops from the yarn, and then successively to draw through these loops another row of loops.

The instrument to draw the new loop through the preceding loop is the knitting needle. This needle is always some kind of a hook; it may be stationary, and the yarn may be manipulated on it by other instruments, or it may be movable endwise, and the yarn held stationary by the other instruments. However done, the mechanical features of the instrument or instruments co-operating with the needle are of great importance, and it will readily be seen that two necessary uses are served by them, first, the formation of the row of loops, and second, co-operation with the needle to cause it to draw the new loops through the old loops. The first of these uses or functions is the sinking, or measuring off and placing of enough fresh yarn to form the new row or course of loops to be added to the previously formed fabric. The instrument which does this, whatever its form, is commonly named a sinker.

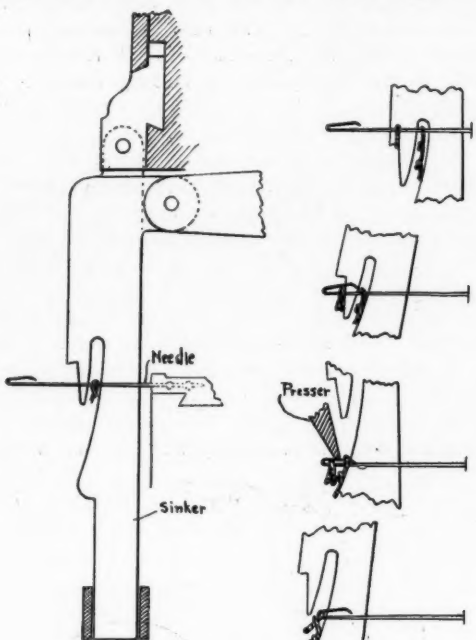


Fig. 1 *Fig. 2*

In the earliest knitting machines, the straight-bar, fixed spring needle machine or "knitting frame" of the Rev. William Lee and his successors, the entire cycle of relative motions between the needle and the yarn was performed by manipulating the yarn on the needle. The needle was therefore stationary, and the motions of the sinkers and their physical formation had to be complex to a great degree.

Fig. 1 shows the general arrangement of the vital parts of such a machine—which, by the way, remains in use today in many localities, and for certain work, like fine woolen and silk gloves, for instance, is not wholly distanced by automatic and modern machinery. It will be seen that the sinker is free to move with respect to the needle in any direction in the plane of the figure. Fig. 2, illustrates the cycle of movements when knitting.

In Fig. 1, the last course or row of loops knit, or a "setting up course" of loops to begin a new piece of fabric is shown, held well down on the shank of the needle between the nose of the sinker and its concave breast. A new row of loops is about to be formed, and the yarn has been laid on the top of the needles and under a notch in the sinkers.

The uppermost part of Fig. 2, shows the next step. The sinker has moved straight down, and the new yarn is sunk or bent between each needle sufficiently far to measure off enough yarn for a new row of loops. If all of the sinkers—one extending between each pair of needles—were moved down at once the yarn would be broken, because when formed into loops, as at this stage, the length of the yarn is greater than when it is merely laid straight on the needles, as in Fig. 1. Provision is therefore made for forming the loops in succession, one after the other.

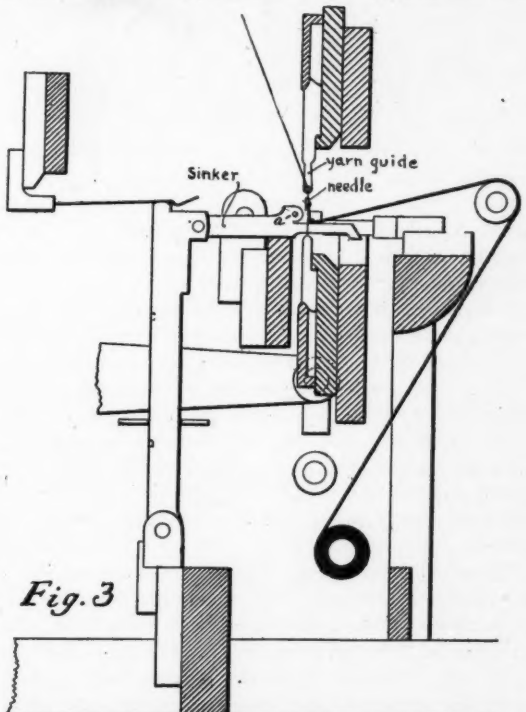


Fig. 3

This can be done by moving one sinker down as far as it is to go before its neighbor is moved at all, and so on successively across the machine. More usually, however, alternate sinkers are mounted so as to be moved successively in this way, but, also, so that they are moved twice as far as is necessary to draw off the right length of yarn between the needles. The remaining sinkers are then all moved down together, the independently movable ones recede, and

the long loops originally formed on every other pair of needles are robbed of enough yarn, which reeves over the intervening needle, to supply loops of the same length between all the needles. The two sets of sinkers are then in alignment in the position shown at the upper part of Fig. 2.

The next step (Fig. 2) is to force the new loops which have been formed under the beards of the needles, preparatory to the third step, "landing" the old loop on the closed beard of the needle. The sinkers are now moving laterally toward the hook end of the needles, and before the old loop reaches the beards, and after the new loop is well under them, the presser-bar is forced down upon all the needle

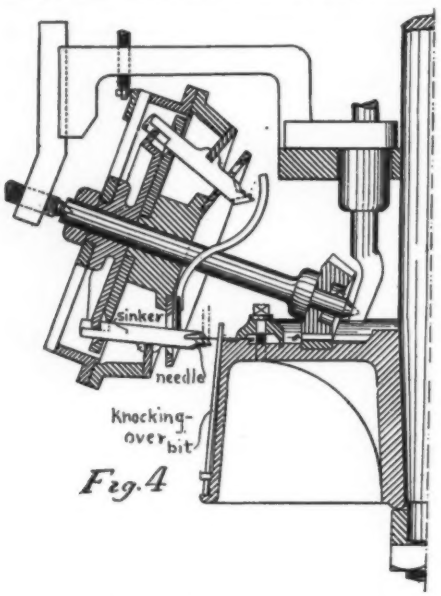


Fig. 4

beards. The third part of Fig. 2 shows this stage. It will be seen that the old loop has landed or ridden up on the closed beard.

The last step in the sequence completes the operation of drawing the row of new loops through the old ones, and is performed by the further forward motion of the sinkers, which, bearing on the yarn of the old course between the previously knit loops, forces or knocks them over the heads of the needles and down upon the sides of the new loops. The sinkers then retire to the position of Fig. 1, the newly formed course being carried with them, taking the place of that previously formed, well down on the shank of the needles.

In the old machines, the forward and back motions of the sinkers, to land, knock over, and force back the loops on the needle shanks are given by hand, the row of sinkers swinging on their upper pivots; the successive motion of the sinkers downward is derived from a cam travelling across the machine driven by a cord, pulley and treadle; the yarn-guide for laying the yarn on the needles is moved ahead of the sinkers by the same cord. Another treadle works the presser-bar, and another lifts the sinkers to their original position.

With the advent of automatic machinery, substantially the same sequence of operation was preserved, but the motion of the sinkers was in most machines simplified by making the needle-bar movable in the direction of the length of the needles, thus dispensing with the lateral motions of the sinkers; sometimes the needles were also made to move upward so as to bring their barbs against a fixed presser-bar, and thus dispense with the means for moving the presser.

The presser device has also been combined with the sinker, as shown in Fig. 3, wherein a little boss or stub *a* projecting from one side of the sinker is brought up against the needle-beard when the sinker is in its extremely projected position. The length of stitch cannot, however, be adjusted through any great range when this device is employed, since the sinker has to go into a definite position with respect to the needle to press the barb or beard; and this position also determines the length of the loop drawn between the needles, and hence that of the knit stitch.

Early in the development of knitting machines, the great lack of economy in power and time resulting from the employment of a straight row of needles, upon which all of the operations must be performed successively in first one direction and then in another, was recognized, and at the beginning of the nineteenth century machinery having a circular row of needles upon which a fabric could be continuously knit in one direction, began to be employed. One arrangement of this sort is shown in Fig. 4, wherein the needles are held radially in the periphery of a rotating dial or disc. This arrangement survives, and is in wide use, and various co-operating devices have been employed to sink the yarn and knock over the loops, of which that shown is a quite modern type. A fixed yarn guide delivers the yarn (as shown in the figure, two yarns, one of which

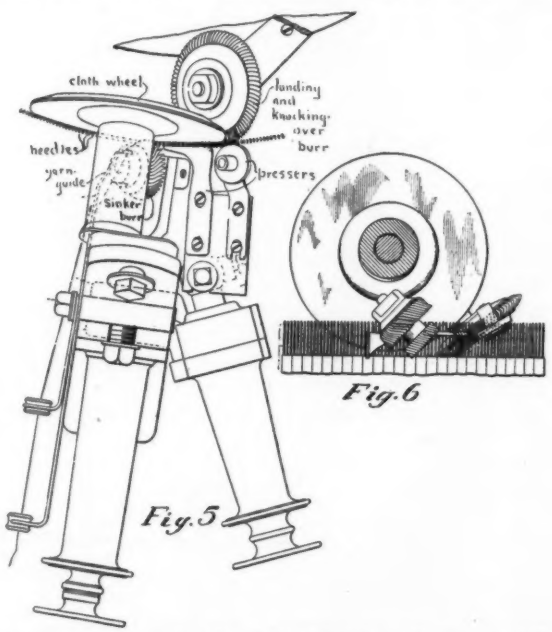


Fig. 5

Fig. 6

is to appear on each side of the fabric) on the upper sides of the needles, and the sinkers shown form it into loops. These sinkers are held so as to swing radially in wheel whose axis is set at an angle to that upon which the needles rotate, so that the circles described by the rotating body of sinkers and the plane of rotation of the needles will intersect at a point following that at which the yarns are fed, in the direction of rotation of the needle dial. The sinker wheel is driven from the dial, so that the only motions of

the sinkers with respect to the needles in their area of intersection are those practically at right angles to the plane in which the needles are held, and a relative motion due to the circular position of the needles, tending to draw the points of the sinkers toward the heads of the needles.

In order to prevent the sinkers from entering too far between the needles and to hold them to their work, they encounter in their rotation about the axis of the sinker wheel a relatively fixed pair of cams. The machine shown is further provided with another cam and sinkers of different lengths, to control the endwise position of the notch in the working ends of the sinkers, and thus determine the relative position on the needles of the two yarns used, and so control the appearance on the face of the fabric of either of the yarns.

It must be understood that some form of needle-presser, a fixed cam or a wheel, immediately follows the sinker wheel in the direction of rotation of the needle dial, and another fixed cam acts on the upper ends of the knocking-over bits to force the old loops out over the closed barbs. The finished fabric is drawn down by some form of take-up device, such as a weight, or frictionally driven rollers, and of course the needle dial may be held stationary and all the other parts rotated about it with identically the same effect.

A still older form of sinker than that of Fig. 4 is the well-known and universally used burr-wheel, of which Figs. 5 and 6 show a typical instance. The so-called English type of circular knitting machine has its spring beard needles arranged on the surface of a cylinder, like a picket fence enclosing a circular plot, and is thus peculiarly adapted for using the simple burr-wheel for sinking and knocking over the loops, although it is interesting to recall that burr-wheels were first used with the radial needle dial type of machine from which Fig. 4 is a development, and were a part of the first circular machines, which originated in France shortly after 1800.

As shown in Figs. 5 and 6, the sinker-burr is a small wheel having a number of blades or teeth set in planes angular to the exis, and all at the same angle. Each blade has a curved contour in which there is a notch or depression near the widest part of the burr. The burr is held, usually yieldingly and adjustably, so that its axis is at a considerable angle to that of the needle-cylinder, with the blades of the burr meshing with and parallel to the needles, where they intersect. If the needle cylinder is rotated, the burr will be rotated with it, and a yarn fed into the notches in the blades will be taken against the shanks of the needles, bent into loops between each pair of needles, and, owing to the angular position of the burr, it will be carried up the needle as it rotates, until the loop is in the correct position under the beard of the needle.

A cloth-wheel to hold the fabric down while the sinker-burr is acting, a presser to press the beards and a similar and oppositely inclined burr-wheel set higher on the needles and inside them, so as to bring it opposite the presser, to land and knock over the old loops, complete the knitting unit for this simplest form of knitting-machine.

It will be noticed that the relative motion of a blade of the sinker-burr and a given needle is exactly that of the ponderous structure shown in Fig. 1, and that this all results from turning one part of the machine on its axis. There is nothing more ingenious and useful in so small a compass in all the textile arts.

(To be Continued.)

A SEAMLESS TOE STOCKING.

The accompanying drawings show a new method for producing a stocking with a seamless toe, and but a single seam, extending along the bottom of the foot, around the back of the heel, and up the back of the ankle and calf portions of the stocking, the leg being of tubular seamless web or being seamed at the rear as desired, the calf portion being properly shaped or fashioned, the heel being seamless except as noted, and the stocking blank being susceptible of production by a continuous knitting operation upon one and the same circular machine, rapid production being thereby assured and the delay and expense of transferring knitted web from one machine to another being obviated.

In the accompanying drawings:—Fig. 1, is a side view of the stocking; Fig. 2, is a view of the blank from which the stocking is made; Fig. 3 is a diagrammatic representation of the needles of a circular knitting machine upon which the stocking blank can be produced; Figs. 4 to 6, are views illustrating other methods of making a stocking, and Fig. 7 is a view illustrating a certain stage in the operation of producing a web from which the blank, Fig. 2, is made.

The stocking shown in Fig. 1, has a seamless tubular leg portion, which may be made with or without a turned welt 2 at the top, the stocking having a shaped calf 3, narrow ankle 4, a rounded heel 5, without side seams and a seamless toe 6, a single seam 7 extending along the bottom of the foot, around the heel and up the back of the ankle and calf portions of the stocking.

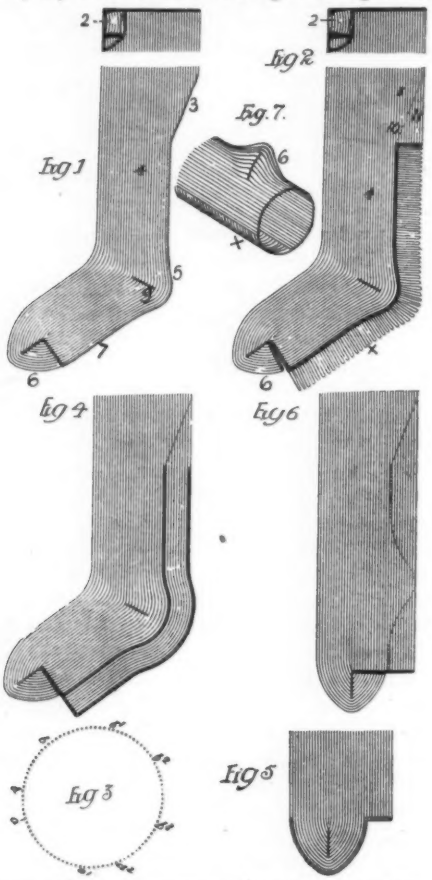
In knitting this stocking an ordinary circular machine can be used of a proper diameter, for producing the seamless tubular web for the leg of the stocking, the web being started at the top of the leg and the turned welt 2 being formed thereon in any available manner.

The production of tubular web is continued until the web is of the desired length for the leg and calf portions of the stocking, whereupon the stitches are cast off of a certain number of needles, say those occupying a segment of the circle between *a* and *a1* in Fig. 3, the needles from which the stitches have been thus cast being then retired or put out of action. Circular knitting is then resumed upon the remaining needles, the knitting yarn floating from *a* to *a1* so as to form projecting loops, such as shown at *x*, in Fig. 2, between the opposite edges of the knitted web, or the yarn being severed at *a* and inserted again at *a1*, if it is desired to save the waste of the floating yarn. A sufficient length of webb for the ankle portion of the stocking is thus knitted and the needles comprised in that portion of the machine represented by the letters *b*, *b1*, and *b2*, and *b3*, of Fig. 3, are then moved out of action, but are permitted to retain their stitches.

To and fro knitting is now resorted to upon the needles *b*, *a*, *a1* and *b3*, and the web is gradually narrowed by dropping needle after needle successively out of action at each end of the acting set adjacent to *b*, *b3*, the needles thrown out of action being permitted to retain their stitches. This narrowing operation is continued until needles at each end of the acting set are out of action, say from *b* to *d* and from *b3* to *d1*, whereupon a reverse operation is begun, that is to say, the inoperative needles from

b to *d* and from *b3* to *d1* are brought into action successively, commencing at *d* and *d1*, the widening being continued until all of the needles from *b* to *a* and from *a1* to *b3* are again in operation.

With the exception that there is a gap, with or without floating yarns between the points *a* and *a1*, this is the ordinary method of making a heel or toe pocket upon a knitted tube, and the result is relatively similar, that is to say, there are at each side of the heel two triangular gussets connected by continuous wales at the bottom of the heel and by a knitted diagonal union 9 at each side of the heel. The needles *b*, *b1*, *b2* and *b3* are now again brought into action



and circular knitting is resumed for the production of the foot web, this operation continuing until a web of the proper length has been knitted, whereupon the needles in the segments *b*, *d*, *a* and *a1*, *d1*, *b3* are retired from action, but permitted to retain their stitches.

To and fro knitting is now performed upon the needles in the segment *b*, *b1*, *b2* and *b3*, and a toe pocket is formed upon these needles by first retiring successively, the needles at the ends of the set, the needles being permitted to retain their stitches until the web is narrowed to the points *b1* and *b2*, whereupon the needles are again brought into action successively, but in the reverse order, so as to widen the web, this operation continuing until all the neddles *b*, *b1*, *b2*, *b3* are again in action, whereupon all of the needles are again brought into action and the production of the tubular fabric of the full diameter for the leg is resumed. The appearance of the web at this stage of the operation will be understood on reference to Fig. 7, the toe pocket formed upon one side of the tube. When this tube is cut adjacent to the end of the toe pocket a stocking blank such as shown in Fig. 2, is produced, the loops *x* or the cut ends of the yarn extending from the front ends of the foot web along the bottom of the latter, around the heel and up the back of the ankle to the beginning of the calf, the full diameter web extending from this point to the top of the stocking.

Courses of stitches are presented at the front end of the sole portion of the foot, and the bottom of the toe pocket so that the stocking can then be completed by looping together these courses of stitches and sewing together or otherwise uniting the edges of the webs constituting the foot, heel and ankle portions of the stocking, the projecting loops *x* being cut off either before, during or after such sewing operation. The seam thus produced is parallel or substantially parallel with the wales bordering the foot, heel and ankle portions of the web and the seam is, as shown by the dotted lines 10, Fig. 2, continued diagonally across the wales in the calf portion of the web until it reaches the edge of the seamless leg of the stocking, the triangular web 11 being cut off either before, during, or after the formation of said seam.

In making the stocking shown in Fig. 4, the knitting of full width tubular web is continued down to the end of the foot, a seamless heel pocket being formed at the proper place. When the end of the foot is reached, a certain number of needles of the machine are retired, either retaining or casting their stitches, and leaving in action only sufficient needles to form a seamless toe pocket, a surplus portion of the tubular web being cut away either before, during or after the formation of the seam on the bottom of the foot, around the heel up the back of the ankle and calf. In knitting this form of stocking, it is preferable to form a line of drop stitches at the line of fold and another such line of drop stitches along the sewing line so as to facilitate the folding of the web, and act as a guide for the operator in sewing the blank to form the stocking. The toe may be formed either by means of a pocket as shown in Fig. 4, or by means of two flat webs as shown in Fig. 5, these webs being afterwards looped together across the toe, such looping forming a substantially seamless union of the two webs, as is well understood.

In Fig. 6, a still simpler method of manufacture is illustrated. In this case full width tubular web is knitted down to the commencement of the toe, no heel pocket being formed. The toe pocket is then knitted upon the limited number of needles, and the surplus web is trimmed off as shown by dotted lines leaving a short section of full diameter web for the corner of the heel. The desired angular relation of the foot to the leg must in this stocking, however, be given to it by boarding or pressing, hence a stocking having the seamless heel pocket is always to be preferred.

A good plan in cotton culture is to plant one-half of the land in cotton, one-fourth in corn and cowpeas, and one-forth in velvet beans, reversing the order so that the velvet beans come on the same land once in four years, cotton twice, and corn and peas once. This is practically a four-year rotation.

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INDEPENDENT-NEEDLE KNITTING.

The accompanying illustrations relate to circular independent-needle knitting machines, so constructed that at any point in the knitting of the fabric one or more needles may be removed from action, and its stitch dropped to form an open-work or drop stitch effect, and at any other point in the fabric, the needle or needles may be returned into action and take the thread.

The device is particularly useful in the manufacture of stockings, either of the drop stitch or open work type, or of the combined drop stitch and tuck-stitch type, otherwise known as lace-work. In stockings of this character, it is essential that there should be no drop-stitching in the heel, toe or lower part of the foot. It is also highly desirable that there should be no drop-stitching in the upper part of the leg, particularly in ladies' and children's stockings.

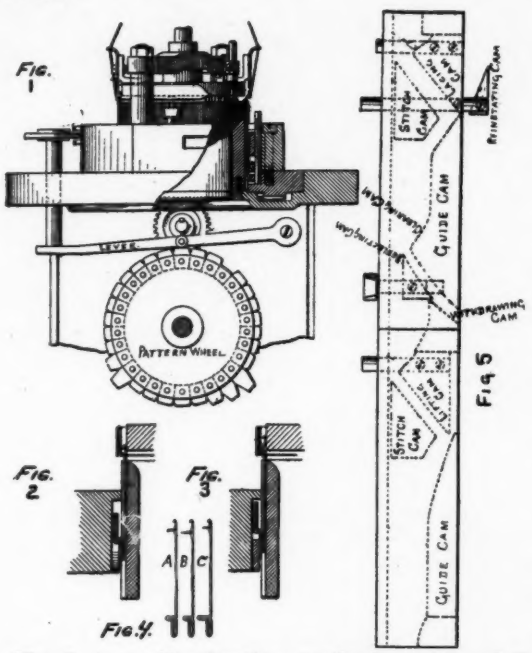


Fig. 1, is a side elevation, partly in section of the part of the machine embodying the devices here referred to. Figs. 2 and 3, are sectional views showing the operation of the needle guard and deflecting cam upon the drop-stitch needles. Fig. 4, is a comparative view of the three sets of needles. Fig. 5, is a developed view showing all the cams.

The particular style of machine to which these devices are applied is of the two-feed type provided with lace-work attachments. Such a machine, as heretofore constructed, is provided with two cam segments, carrying respectively needle-lifting cams, stitch cams, beyond the needle-lifting cams respectively, and guide cams; the needle-lifting cam raising a needle to raise its latch above the previously formed loop, and bring the hook above the thread feed from the thread carrier, and the stitch cam depressing the needle to cause the hook to engage the thread and draw it down through, cast off the loop, and form a new loop. The cams of the two segments are exact duplicates except that one of the needle-lifting cams raises the needles to a higher level than the other.

The regular needles *A*, are raised by both of the needle-lifting cams a distance sufficient to draw the loops down over their latches, but the tuck-stitch needles *B*, being provided with longer latches than the regular needles, will not be elevated by the lower of said cams a sufficient distance to permit the loops carried thereby to clear their latches, and consequently each of the needles will retain its loop, and elongate it while drawing down the new thread engaged by its hook to form a crossing loop.

The higher of the two needle-lifting cams, however, raises the tuck-stitch needle sufficiently high to raise its latch above the two loops carried by it, and thereafter, when a tuck-stitch needle is again depressed by the action of the adjacent stitch cam, the thread caught by the hook will be drawn down through, and cast off, both the elongated loop and crossing loop, and form a new loop. The lower of the needle-lifting cams may be designated, therefore, the lacing cam, and the new cams forming part of the contrivance are preferably applied to the segment that carries the lacing cam.

According to this arrangement instead of omitting one or more needles on each side of a tuck-stitch needle, drop-stitch needles *C*, are provided. When it is desired to move these needles out of action, these needles, after passing the stitch cam in advance of the lacing cam, are caused to cast their loops and be drawn down out of action and to be held out of action until it is desired to again bring them into action.

For this purpose the following means have been provided. The drop-stitch needles are formed with longer butts than the other needles, and with shorter latches than the regular needles. By means of a clearing cam, which is shown as integral with the guide cam, all the needles are raised but only the drop-stitch needles are raised to a height sufficient to elevate their latches above their loops. The deflecting cam is not sufficiently thick to engage the short butts of the regular and tuck-stitch needles, but is of sufficient thickness to engage the long butts of the drop-stitch needles. This cam (when depressed) deflects the drop-stitch needles downwardly and brings them under the action of a withdrawing cam, which is formed by cutting a cam-way in that part of the guide-cam beyond the clearing cam. During the downward movement of the tuck-stitch needles, the loops carried thereby slip over the closed latches of the needles and are thus cast off. Thereafter, the drop-stitch needles remain in their lowered inoperative position until such time as it is desired to bring them into action, at which time a reinstating cam is moved upwardly, and the drop-stitch needles are deflected thereby to bring them under the action of the guide cam, which restores them to operative position. Previously to the elevation of the reinstating cam the deflecting cam has been raised, so that it will be ineffective to deflect the drop-stitch needles to the withdrawing cam. Thereafter, the drop-stitch needles will operate as regular needles.

It will be understood that in passing from lace knitting to plain-knitting, not only is it necessary for the drop-stitch needles to be moved into operation, but it is also necessary (or at least desirable) to cause the tuck-stitch needles to knit as regular needles. This latter result is effected by raising the lacing cam to a height sufficient to lift the tuck-stitch needles, as well as the regular needles, a dis-

tance sufficient to cause the latches of the tuck-stitch needles to clear the loops carried by such needles.

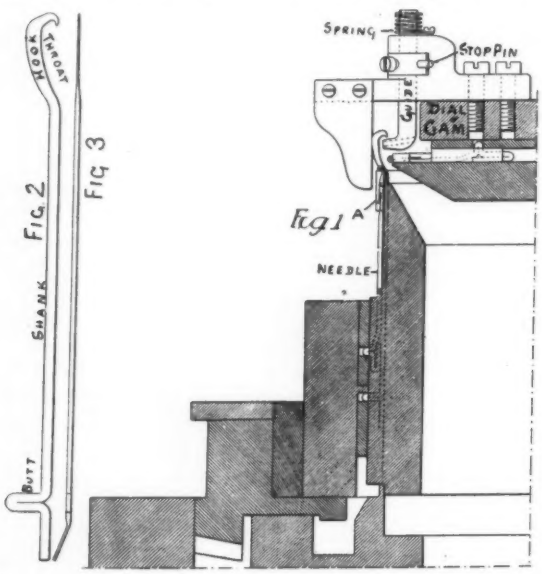
LOOP-DRAWING HOOKS.

The accompanying drawings represent a new device attached to a knitting machine, the objects of which are to improve the action of the loop-drawing hooks used in connection with the class of knitting machines which combine a fleecing weft thread with a knitted fabric, and to prevent injury to the hooks or to the fleecing thread feeder by contact of one with the other.

Fig. 1, is an enlarged vertical section of parts of the dial cam plate, the dial, the needle cylinder, the cylinder cam ring and other parts of a rib knitting machine, sufficient to illustrate the application of the device. Figs. 2 and 3 are respectively a side view and a front view of one of the looper hooks.

The device is also applicable to that class of machine in which the needle cylinder and the needle dial rotate, and the dial cam plate and the vertical cam cylinder are stationary.

Each of the looping hooks has a shank portion with butt as shown in Figs. 2 and 3 for engagement with the



cams whereby the reciprocating movement of the looping hook is effected, and the hook is reduced in thickness in respect to the shank, as shown in Fig. 3, so as to provide the maximum amount of clearance between the same and the sinker bits of the needle cylinder. The grooves for the reception of the looping hooks are deeper than the grooves which receive the needles, at the inner ends of the hook-receiving grooves, to a point some distance belows the tops of the stationary knocking-over bits *A* as shown in Fig. 1, so that the loops of fleecing yarn can be drawn further than the loops of knitting yarn and can be cast to the inner side of the stitches carried by the cylinder needles.

To aid in throwing the fleecing yarn loops inwardly each looper hook has an upwardly beveled throat, the effect of which, as the hook is pulled down onto the fleecing yarn, is to direct the latter inwardly against the depending point of the hook. The fleecing yarn guide has a vertical stem which is free to turn in bearings in a bracket secured upon the upper face of the dial cam ring, as shown in Fig. 1, the upper projecting end of the stem being acted upon by a coiled spring which tends to constantly maintain the hooked lower end of the feeder in position for delivering yarn to the hooks, this position being determined by contact of the bracket and a stop pin on the stem of the feeder. If, however, a misplaced hook should strike the feeder, the same is free to yield so as to permit the passage of the misplaced hook and will then be restored by the action of a spring to its proper operative position, thereby preventing injury either to the hook or feeder which would necessarily result if the said feeder was rigidly supported. In the machine shown in the drawing, the cams for imparting vertical reciprocation to the looper hooks are located below the cams for actuating the knitting needles.

In order to insure the presentation of the hooks in proper position to receive the fleecing yarn from the feeder a hook presser is employed which travels with the fleecing yarn feeder and so acts upon each of the hooks which is to receive the yarn from the feeder so as to insure the catching of the yarn by the hook as the latter is drawn downwardly. Where the loops of fleecing yarn are to be drawn between successive wales of the fabric and where, therefore, each of the looping hooks has to be thus acted upon, a presser is employed consisting of a simple plate of sheet metal secured at its upper end and bent at the lower end so as to extend downwardly at an angle across the backs of the hooks.

OPERATING SPECIAL NEEDLES IN KNITTING.

The accompanying illustrations show a mechanism for operating special needles in knitting machines.

In many varieties of knitting it is necessary to cause certain of the needles to perform different movements and, therefore, different operations from the others. Usually these needles are called upon to produce a special form of stitch, while the others continue to produce plain knitting, and for the present purpose we will distinguish them from the other needles by using the phrase "special needles." They may be interspersed among the others singly or by groups. The operations which they may perform are various. For example, in the production of vertically striped, patterned or figured knitting, it often occurs that certain needles must produce at intervals in the fabric tuck stitches, draw stitches, drop stitches, or the like.

Various methods have been devised for effecting the temporary separation of the special needles from the others, such, for example, as causing the butts of the special needles to differ in length from the butts of the rest of the needles. Likewise, various means have been proposed for controlling the distinct operations of these needles during that portion of their course when they operate differently from the others.

Among other uses the present devices relate to the operation of the special needles to produce open work in hosiery, or other vertical stripes, with provision of means whereby the open work or other stripe may be succeeded by plain knitting at any point of the knitting, as for example in knitting the back of the leg of a stocking

with open work or stripes, while the heel, sole and toe are of plain knitting.

Figure 1, is a plan view of the knitting and cam cylinders of an ordinary stocking knitter, embodying the mechanism here referred to. Figs. 2 and 3, are side elevations, respectively, of a plain and special needle. Fig. 4, is an alternative way of forming the butt of the special needle. Fig. 5, is a partial horizontal section of a cam cylinder showing, *in situ*, the switch-cam and special draw-down cam. Fig. 6, is an elevated view of these cams. Fig. 7, is an enlargement of the vertical section *7, 7*, Fig. 5, with the hooked butt of a special needle in engagement with the cams. Fig. 8, is a similar enlargement of the

FIG. 1.

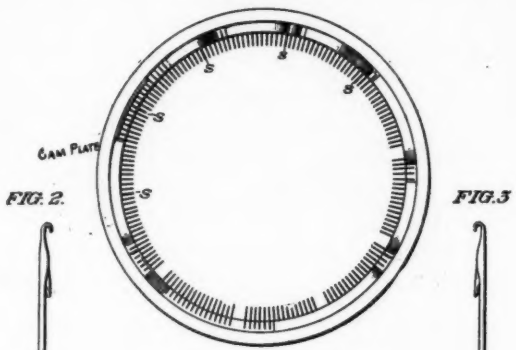


FIG. 2. FIG. 3

FIG. 8. FIG. 7. FIG. 9.

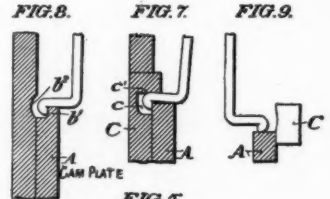


FIG. 5.

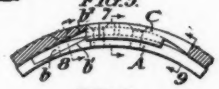



FIG. 4.

FIG. 6.

vertical section *8, 8*, Fig. 5. Fig. 9, is a similar enlargement of the vertical section *9, 9*, Fig. 5 viewed in the opposite direction.

The plain needles are of the ordinary construction shown in Fig. 2. The special needles, shown in Fig. 3, differ from those plain needles in that the part below the butt, and also part of the lower side of the butt itself, is cut or broken away, leaving the butt to terminate in the form of a curved hook.

A cam plate *A*, is placed on the inside of the cam cylinder after the manner of ordinary knitting cams, at the point where it is desired that the course of the special needles shall deviate from the ordinary cam groove, the upper edge of this cam plate being arranged to form part of the lower side of this groove. The upper and operative surface of this cam plate consists of three portions, (see Fig. 6), a slight rise *a*, a level *a1*, and a long descent *a2*. Along the top of this cam plate, chiefly coincident with the level *a1*, is cut a horizontal channel or groove *b*, which occupies only that side of the plate which is farthest from the needle cylinder, and therefore adjacent to the wall of the cam cylinder, (which for convenience may be termed the outer side of the plate), and which nowhere breaks the inner wall of the cam plate. The inner edge of this channel is deflected across to the outer side of the plate, thus forming a cam incline *b1*, which differs from all the ordinary needle cams of a knitting machine in that it exerts its force along the line of a radius of the knitting cylinders. Opposite the cam incline *b1*, the wall of the cam cylinder has a corresponding horizontal groove *b2*, cut in it.

Outside of cam plate *A1* there is inserted in the wall of the cam cylinder a cam plate *C*, which may be termed a special draw-down cam. Its shape will be best understood from its illustrations in Figs. 5 to 9. Its inner surface has an inclined channel *c*, cut into it, corresponding in position to the descent *a2*, of cam plate *A*, and so arranged in reference to it that the descent *a2*, comes opposite about the median line of the channel *c*. The upper edge of this channel forms a cam incline *c1*, which partially overhangs the upper edge of cam plate *A*, as seen in Figs. 5, and 7.

The operation of the mechanism thus described is as follows: The line or circle of the butts of the needles, consisting of plain needles having interspersed among them special needles with hooked butts (Fig. 3), run along the cam groove of the cam cylinder until they reach the rise *a*, of the switch cam. Ordinarily, it is true, the needles are supported fixedly in the machine and it is the cam groove which rotates in the opposite direction but it is much more convenient to consider only the relative motion of these parts and to think of the cam cylinder as stationary and the needle butts as running in the groove. When the butts of the plain needles reach the cam plate *A*, they ride up the rise *a*, to the level *a1*, and then pass on without further interference, for the special draw-down cam *C* does not project far enough to reach or affect them, as will be best seen by observing their relative positions in Fig. 1. When the butts of the special needles reach the switch cam, the downwardly projecting hook at the end of the butt enters the channel *b*, whereupon the flat or cut edge of this hook is immediately brought into contact with cam incline *b1*, so that the needle, instead of being elevated by rise *a*, is drawn out radially a short distance, against the tension of the needle band into the position first of Fig. 8, and then of Fig. 7, the end of the butt being thus gradually drawn into the channel *c* of cam plate *C*. As soon as the upper edge of the butt comes into contact with the overhanging cam incline *c1*, it is compelled to ride down it, disengagement of the butt from the channel *c*, being in the meantime prevented by the upper edge of the descent *a2*, of cam plate *A*, which projects part way over the channel. The special needle is therefore not free to disengage this cam and to return to its normal seat in the needle cylinder until it has reached the lower end of the cam incline *c1*, by which it has in the meantime been depressed a corresponding distance. The separation or sorting of plain from special needles thus effected may then be taken advantage of to further deflect by other cams these needles from each other and to cause them to go through such separate operations as may be desired.

METHODS FOR MAKING HOSIERY.

We show herewith a new method for making machine-knit hosiery, with special reference to the formation of a welt or hem at the top of the leg, by a certain operation of the machine upon which the stocking is knitted.

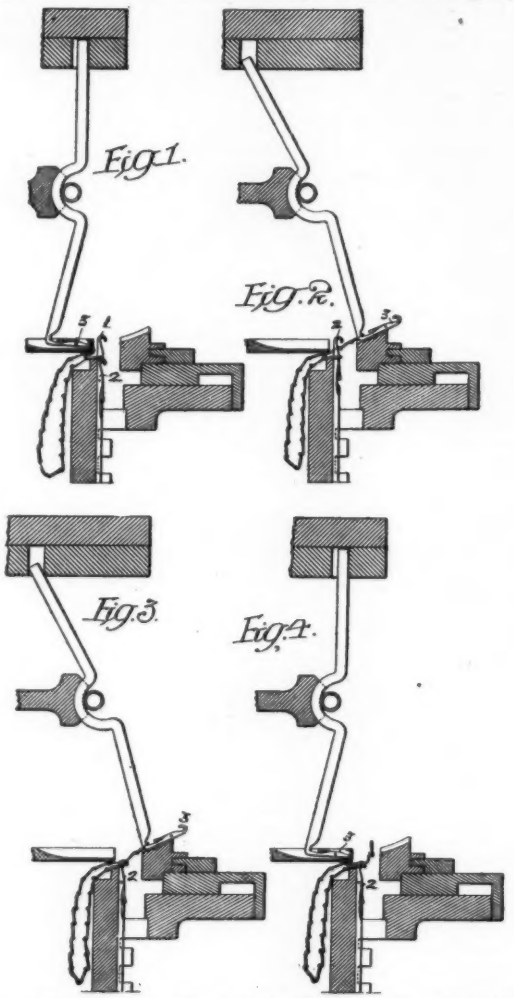
Fig. 1, is a sectional view of the essential parts of the machine after the desired length of web for the welt has been knitted; Figs. 2, 3, and 4 are similar views illustrating successive steps in the operation of transferring stitches from the dial needles to the cylinder needles.

Ordinarily, long stockings composed of plain web, and made by one continuous operation on a circular seamless knitting machine capable of knitting seamless heal and toe pockets automatically, have the stocking finished at the top by turning in a hem thereon and sewing the inturned edge of the knitted web to a folded portion of the body thereof, so that the stitches will be formed through the web adjacent to the edge and partly through the body web, the needle passing through the folded portion of the latter so as to produce what is termed a concealed stitch. Great care is necessary on the part of the operator in performing the sewing operation, because it is customary to trim the raw edge of the knitted web close to the line of stitches, and unless this line of stitches is disposed closely adjacent to the folded edge of the web the latter is likely to be cut by the shearing mechanism of the machine, and these cut portions must be subsequently mended, thus involving additional expense, and, at the best, producing an imperfect stocking; furthermore, by this practice, the excess of material trimmed off by the cutting mechanism of the sewing machine is necessarily wasted.

In carrying out the method here shown of forming welts or hems at the upper end of the leg tube of the stocking, the purpose is to avoid all of these objections and a perfectly turned welt, such as characterizes what is termed "full fashioned" hosiery, formed upon a seamless tube; and by means which do not interfere with the ordinary operation of the automatic seamless knitting machine in the performance of its other functions.

The machine has three sets of needles 1, 2 and 3, for instance the needles 1 and 2 may be those of the cylinder of an ordinary machine capable of knitting a seamless tube with heel and toe pockets thereon, but having also means for governing the operation of one set of needles independently of the other as hereinafter set forth, the needles 3 being guided by a dial similar to that of an ordinary rib knitting machine. The latter needles, however, co-operate with the cylinder needles only in the welt forming operation, hence at other times the machine operates simply as a machine for producing plain tubular seamless web, with heel and toe pockets.

In commencing the stocking, according to the preferable method, every other cylinder needle 2 is out of action and is replaced by a dial needle 3, the first course of yarn being applied alternately to a cylinder needle and to a dial needle. The dial needles 3 are then retracted and held in the retracted position so as to retain the loops or stitches of yarn which have been applied to them, and the cylinder needles 2 are then brought into action, and seamless circular web is knitted upon all of the cylinder needles 1 and 2, until a band of the desired width for the welt or hem has been produced, the band depending between the cylinder and dial needles as shown in Fig. 1. The machine should be equipped with the ordinary web holders, no take-up or tension devices being required. The cylinder needles 1, are now projected, but not to such an extent as to clear their stitches, as shown in Fig. 1, and the dial needles 3 are then thrust outwardly between said needles 1 to an abnormal extent, as shown in Fig. 2, so



that while certain portions of the knitted web will be held within the circle of cylinder needles 1, intervening portions of the web will, by engagement with the hooked inner ends or portions of the stems of the dial needles 3, be carried outwardly beyond the circle of needles 1, as shown in said Fig. 2. The intervening cylinder needles 2 are then raised to such an extent as to enter stitches of the fabric drawn outward by said dial needles, the parts being so constructed, by preference, that the stitches thus engaged will be those which are knitted in a course following the loops first formed on the needles 3, as shown in Fig. 2, and by the dotted circles *w* in Fig. 2, the construction of the dial needles permitting the cylinder needles to rise in the same plane as said dial needles, and directly in the rear of the stitch-engaging portions of the same. The cylinder needles 2 are then lowered so that their hooks are below the level of the shanks of the dial needles 3, as shown in Fig. 3, and the dial needles are then retracted, as shown

in Fig. 4, so as to cast the stitches upon them, ordinary circular knitting upon all of the cylinder needles being then resumed for the production of the stocking leg, which will thus have formed upon it a properly turned welt or hem integrally united with the seamless circular tube.

KNITTED WEB.

We herewith show a method for producing a backing web for knit goods adapted for the production of a fleece. Fig. 1, is an exaggerated view of the fabric looking at the face side of it. Fig. 2, is a view of the backing web of the fabric, and Figs. 3 and 4 are views showing the manner in which the fabric is produced.

In Fig. 1 of the drawing, *1* represents the face web and *2* the back web, the stitches of the face web being shaded in order to more clearly distinguish them from the stitches of the back web, which are unshaded. The two webs are connected at intervals, as shown at *3*, by loops of yarn of the face web engaging with wales of the back web.

When the stitches of the back web are drawn towards the front face of the fabric, the exposed face of the back web presents a surface composed wholly of loops, as shown in Fig. 2, and the brushing or gigging of the same to form a fleece can be readily effected.

Fig. 1

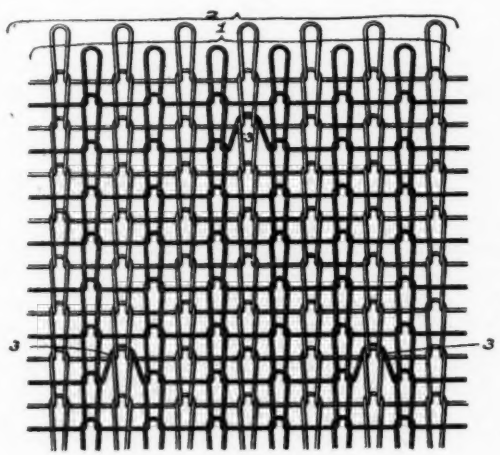


Fig. 2

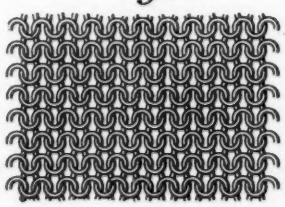


Fig. 3

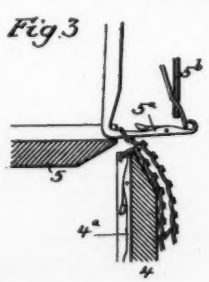
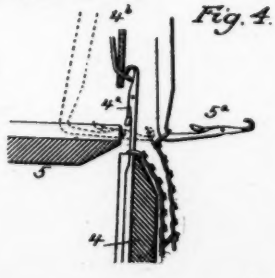


Fig. 4.



In the production of this fabric there is employed a knitting machine having two needle beds *4* and *5*, provided with needles *4a* and *5a* which are intended to be combined with the usual cams for reciprocating the same for knitting purposes, and with one or more yarn feeds for each set of needles, the yarn feed for the needles *4a* being represented at *4b* in Fig. 4, and the yarn feed for the needles *5a* being represented at *5b* in Fig. 3.

Owing to the fact that both the cylinder and dial needles draw their stitches in the same direction the web produced by the dial needle overlies that produced upon the cylinder needles and it is necessary to get this overlying web out of the way in order that the cylinder needles may rise to receive the yarn from the yarn guide *4b*. For this reason the dial needles are projected clear of the dial *5* and to a point beyond the cylinder needles *4a* wherever one of the yarn feeds *4b* occurs, as shown in Fig. 4.

In order to effect the tying of two webs together, selected dial needles may be only partially projected, as shown by dotted lines in Fig. 4 instead of being fully projected as shown by full lines in this figure, whereby the partially projected dial needles will receive the knitting yarn fed to the cylinder needles and will form loops of the yarn which will be cast off from the special needles with their stitches at the next dial yarn feed *5b*.

THE KNIT GOODS SITUATION.

The knit goods situation is more or less affected and upset by the decline in prices in the cotton yarn market. This condition of affairs renders it difficult to look ahead any distance in predicting the future trend of trade. At the present moment there is a vast deal of uncertainty, with a strong sentiment that values have reached their top notch, and that a downward course may reasonably be expected, which is having its detrimental effect in the placing of orders for future delivery, as both sellers and buyers are in a quandary where to establish a line below or above which it is not safe to operate.

Still the manufacturer is in fairly good control of the market, as the goods most in demand are short in supply, so that buyers find it difficult to obtain what they want, notwithstanding all operations are being conducted on a conservative basis. No one seems to be anticipating a demand beyond what can be readily seen as likely to come into sight in the ordinary course of business. There seems to be a general agreement in the trade that all reorders and future orders will be consummated only on a lower basis of price unless there is a decided improvement in the price of raw material and conditions of manufacturing, a state of affairs that can hardly be reckoned on in any business transaction. Manufacturers, however, are slow in their willingness to take a position where concessions are granted until they are able to make a profitable use of their stock of yarn bought at above present rates.

The hosiery situation shows but little change from that of a month ago, except that a greater weakness is felt, though not of so pronounced a character as to affect prices materially. This condition, however, is not expected to continue, and buyers are loth to place orders for future delivery, except at prices which are much below those now

prevailing, even in cases where actual or urgent wants are anticipated. At present the supplies of desirable hosiery are low so that manufacturers are showing no uneasiness except in the uncertainty of the future. On popular makes, jobbers report that they have been doing a large business for the next spring, and manufacturers of these lines are declaring that they cannot accept further orders for the coming season.

Dyeing, Bleaching and Finishing

CALICO PRINTING.

The Perrotine. By 1850, Great Britain was the Largest Producer of Print Goods, Next to Which was the United States. American Calicoes Attained a Commendable Reputation by 1876.

BY HENRY G. KITTREDGE.

V.

One of the most interesting pieces of mechanical ingenuity that has been made in the textile printing industry is the machine known as the perrotine (See Art. III, illustrated), which is so called in honor of its inventor, M. Perrot of Rouen, France, who introduced it into the French printing establishments in 1834, but which subsequently underwent very considerable improvements. The machine was intended for block printing without manual labor, and has not yet gone out of use, being adopted in Alsace and Belgium, but has been in very little use in England. In 1844, M. Perrot exhibited a machine for printing four colors, the same in principle as that seen in his first machine, but, of course, more complicated. With the perrotine machine the printer found that he was capable of doing not only more correct execution of difficult patterns, but could do them with greater economy of manual labor. Variously colored patterns could be printed by it on pure white grounds with the utmost delicacy of execution, and two men could print in three colors from 1,000 to 1,500 yards of calico daily, an amount of work which with the ordinary block would have required 25 printers and as many assistants. The machine today, as it did fifty years or more ago, carries three blocks much larger than those used in hand printing, their length being equal to the width of the piece and their width from two to five inches. They are engraved in the same manner as the hand blocks. The three blocks deliver their impressions exactly at the same instant in three colors. The blocks are pressed against the cloth by means of springs which represent the action of the block printer's hand. The movements of the machine may be stated as follows: The fabric advances by a length exactly equal to the breadth of the block and with it the endless web and the blanket so that the portion of the fabric which leaves the third block behind it is fully printed; that which was under the second advances opposite to the third; that which was under the first moves along to the second; and a fresh breadth of the white or unprinted fabric arrives opposite the first. This succession of movements is renewed and repeated till the fabric is completely printed.

By 1850, Great Britain was the largest producer of print goods in the world and the United States her second in quantity, and France her second in value of production. The United States production was consumed at home, so that England's only competitor in foreign markets was France, and this competition was confined wholly to fine goods or to those in which taste and design were central factors. The United States stood first among nations in the amount of consumption of printed goods per capita of her people, and this position she retains today, while her printing has been remarkable for mechanical power and speed, more so than for taste, until within comparatively recent years.

The number of print works in Great Britain and Ireland, exclusive of the London district, in 1851, was 202, of which 120 were in Lancashire, 81 in Scotland and one in Ireland. This showed an increase since 1840 of 27 works in Lancashire and 11 in Scotland, while in the same period Ireland lost two. It is remarked by an authority at this period that "it is an extraordinary fact that for the last 25 or 30 years in the Lancashire district no more than one or two new print works of any great extent or power have been erected, while a greater number of large establishments have been discontinued. The power then by which the annual production has been raised from eight to twenty millions has been chiefly gained by the extension of existing establishments; certainly the increase of producing power has been equivalent to the increase of demand. The exports of printed goods from Great Britain, in 1851, amounted to 15,544,000 pieces, being sent chiefly to Brazil, the East coast of South America, India, the United States and to the Levant, leaving for an estimated home consumption 4,500,000 pieces. This home consumption showed an increase of 2,200,000 pieces within twenty years. This increase was due very largely to the repeal of the law imposing a duty on foreign imports, and the decrease in the cost of production, giving the consumer goods in much better taste and value at one half the price. At that time the conditions of the textile printing business in other parts of Europe were as follows: The Zollverein, Austria, and Bohemia produced for their own markets, and by their protective duties prevented any other supply except of very fine French goods. Their prints were good in execution, imitations of French taste in the finer fabrics, and of English designs in the medium and lower qualities. Switzerland had a limited but a choice production with her markets open to the products of the world with simply a revenue duty. At that time Russian printed goods presented no distinctive or meritorious character, and her market was prohibited to the British except the port of Odessa. Spain produced goods of an inferior quality and to a limited amount, and prohibited imports, except those of a very fine quality, at a 50 per cent duty. English printers, however, found their way into Spain, but through smugglers chiefly from Gibraltar.

In 1876, at the time of the world's exposition at Philadelphia, there were 33 print works in the United States, operating 331 printing machines, and it was calculated that

by allowing to each machine a production of 200 pieces per day, a fair average, for 40 weeks in the year, there would be a total production of 15,888,000 pieces printed annually, all of which was for domestic consumption, the export trade being practically nothing. The American calicoes at that exposition were very highly commended by foreign judges, and were considered to be fully equal in design, color and execution to those exhibited by any other country; the higher grades of the more expensive French goods not being represented.

There is no clear and distinct line to be drawn between printing and dyeing, printing being local dyeing in which mechanical processes operate as the principal factors in any demarcation that may exist. It is inconvenient to give more than an outline of the operations of textile printing as there are so many different methods of treatment required, in the use of a large number of dyes that are now at the disposal of printers, and because of so many tastes and purposes to be satisfied. Before printing, the cloth must have removed from it all impurities and extraneous matter so that the fiber shall be presented to the dye in as pure a condition as possible. The cotton cloth, after the scouring or cleansing processes have been gone through with, must be given a bleaching treatment so as to remove all the natural coloring matter, and in this condition it is oftentimes ready for the printing press, but the majority of dyes yield more satisfactory results if the goods are impregnated with substances to assist in forming a color lake on the fiber.*

*A lake is a pigment made by combining, as by precipitation, some animal or vegetable coloring matter with a metallic oxide.

THE PREVENTION OF VAPOR IN DYE-HOUSES.

B. F. S.

The problem of steam prevention in dye-houses requires for its satisfactory solution a knowledge of the atmospheric conditions under which the vapor is rendered invisible. Successful steam removal is not readily accomplished, but means are at hand for substantially preventing the presence of vapor by rendering it invisible, and therefore unobjectionable. The method may be best understood by consideration of a specific case. Suppose a room in which the air is at 70 degrees temperature, and has a relative humidity of 70 per cent. That is to say it contains 70 per cent of the moisture that it is capable of holding in suspension without the vapor becoming visible. Seventy per cent. humidity at this temperature corresponds to 5.5 grains of moisture per cubic foot. If the air was saturated it would contain 8 grains of moisture. In other words, it possesses capacity to take up only 2.5 grains of moisture per cubic foot.

One pound of water is equivalent to 7,000 grains, therefore it would require 7,000-2.5 or 2,800 cubic feet of air under the above conditions to merely absorb without rendering invisible, the vapor formed by the evaporation of one pound of water. It is, therefore, evident that a renewal of air is absolutely necessary to the prevention of visible vapor, and that under the above conditions at least 2,800 cubic feet of air must be supplied for each pound of water evaporated.

Suppose that the external air be at a temperature of 30 degrees, and that a common exhaust fan be introduced to remove the air from the room at the rate of 2,800 feet for each pound of water evaporated, and further suppose that the vats and tubs are uncovered, so that there is a free discharge into the atmosphere. The only source of supply of air under ordinary conditions is that incident to leakage around windows and doors, and through crevices, and from these sources must the fan draw its supply. The natural result of the admission of cold air to a warm room is the raising of the temperature of the admitted air, and the cooling of the temperature within the room, but such change in temperature is not equable throughout the room, the coldest air being found at the points of ingress.

If, for instance, with the external temperature at 30 degrees and the internal temperature at 70 degress the air at or near the points of admission has a temperature of only 50 degrees, the air will have a capacity of only 4 grains of moisture per cubic foot. In other words, it will not take up as much as the air at 70 degrees actually holds when saturated to only 70 per cent. That is, a temperature of 50 degrees is below the dew point of the atmosphere existing within the building, and the vapor immediately becomes visible. However, the more air removed by the exhaust fan, the greater must the inward leakage be, and the worse will by the conditions as regards the presence of vapor.

It is evident from the above that steam cannot be *removed,* but that it can be *prevented,* and that success can only be attained by the adoption of some device for supplying large volumes of air at a temperature higher than that of the room.

The simplest means of preventing steam is to increase the temperature of the room itself, at the same time that a reasonable circulation of air is secured. If, for instance, the atmosphere of 70 degrees temperature and 70 degrees humidity previously assumed to be heated to 80 degrees, the air will, because of the higher temperature, possess greater capacity for absorption. Saturated air at 80 degrees contains 11 grains of moisture per cubic foot, or 11-5.5 equals 5.5 grains—can be taken up. That is to say, 7,000÷5.5 or only 1,273 cubic feet of air will be required to absorb the vapor caused by the evaporation of one pound of water.

If, however, the air be heated to, say 130 degrees, before delivery to the room, it will contain less than 10 per cent. of its total absorbing capacity. Its avidity for moisture will therefore be great, and it will readily absorb all vapor with which it comes in contact. If with such absorption its temperature be maintained sufficiently above the dew point, no more vapor will be visible.

A three-year rotation in cotton culture is better than one of two years. The three-year rotation for the first year might consist of rye, oats, or wheat for hay, followed by cowpeas; second year, corn with cowpeas; third year, cotton. Cut the corn when ripe and shred the stalks.

Notices of mill projects, additions and improvements, in buildings and machinery, are solicited by COTTON.

As indicated by its botanical name, *Gossypium barbadense,* the original home for the Sea Island cotton plant is thought to have been the West Indies. When first introduced into the mainland of America, about 1786, it is reported to have been considerably different from the present form.

DYEING DELICATE WOVEN FABRICS.

We show, herewith, an apparatus for the dyeing in the piece of such loose or open weave materials as chiffon, gauze, etc.

Fig. 1 is a side view of a frame or holding device, arranged in the dye tub, the inner walls of the latter being broken away. Fig. 2 shows the manner of arranging the fabric on the holding bars, preparatory to introducing the whole into the frame.

The apparatus at present in use for holding the fabric while undergoing the dyeing process has been found to be objectionable for several reasons, the principal among which is that great care must be used or else the apparatus will not meet the requirement of maintaining a uniform tension on all parts of the fabric. Without the maintaining of such a uniform tension, the fabric, being extremely delicate, has its texture spoiled and misshapened, thus materially reducing its sale value.

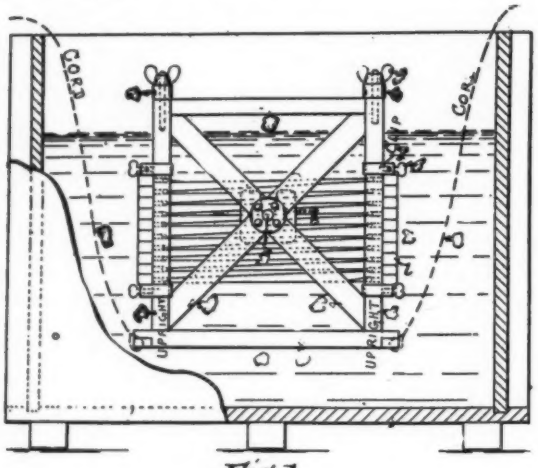


Fig. 1

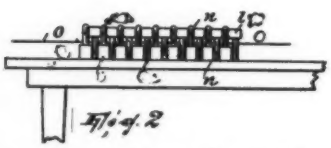


Fig. 2

The present arrangement has for its object to provide an apparatus whereby the goods may be securely held while undergoing the dyeing process in perfect condition for not only attaining the best dyeing effects, but absolutely without permitting the goods to be subjected to influences, whether derived from the apparatus itself or from shrinking or the movement of the goods through the dyeing fluid, which would tend to spoil the texture or disarrange the weave.

By this apparatus, the goods may be placed in the holding device in a relatively large quantity and without requiring skilled labor or any great loss of time, and when so arranged in said apparatus the whole is in convenient form for introduction into a dye-tub and for such subsequent agitation therein as the dyeing process requires.

The frame is made to accommodate as much of the material to be dyed as the user might at any time find necessary, consistent with convenience in handling; and according to the amount of fabric which, at any time, is to be dyed, so a greater or less number of the holding-bars are arranged in the frame.

The holding-bars, supporting the fabric, are arranged in the frame in the manner shown in Fig. 1, and in order to accomplish this in a convenient manner the operator first arranges the holding-bars on a table or other support as shown in Fig. 2, alternate holding-bars being inverted.

The solid line *o* in Fig. 2 designates the fabric which, after the holding bars have been thus arranged, is threaded through between the cord or wire and the strip *l* of each holding-bar. The material is pinned or stitched temporarily around the cord of the furthermost holding-bar and then the latter is removed to the frame where, the top-bars having been first removed so as to permit the fabric to enter the frame, the holding-bar is arranged against the further pair of uprights with its pegs projecting inwardly, as shown in Fig. 1. The next holding-bar is now brought to the frame and arranged in a similar manner with respect to the other two uprights, and so on until the last holding bar has been arranged in the frame, when the end of the goods is pinned or stitched to the cord or wire thereof. The top-bars may now be replaced.

In order to provide for accommodating more or less of the holding-bars in the frame as required, clips, arranged to slide vertically on uprights and having thumb-screws for securing them where adjusted, may be provided; each two pairs of clips receiving between them the corresponding series of holding-bars and thus securing them against free movement. By vertically adjusting the clips the goods may be arranged at any elevation in the frame.

When the goods have been arranged in the frame the whole is taken to the dye-tub and set therein with the trunnions journaled in the bearing blocks, whereupon the frame may be rotated or oscillated to cause the dye to thoroughly impregnate the goods; the movements of the frame may be effected by cords extending out of the dye-tub.

When the dyeing operation has been completed and the frame removed from the dye-tub, the goods may be quickly detached by simply cutting the cords *n* which leaves the goods in convenient folds, flat and regular, ready to be wound up on a beam.

THIOGENE BLACKS EXTRA CONC.

These blacks which correspond in shade to the conc. marks are considerably stronger and have some decided advantages on this account. The amount of dyestuff being less and only requiring the same proportion of sodium sulphide, the amount of the latter in the dyebath is therefore reduced, which is of great advantage. Besides a reduction in weight of dyestuff will save trouble in handling, freight, etc.

On account of their great strength, these blacks will give a full deep shade, with 5 per cent of color on raw-stock which well illustrates their great advance over the sulphur blacks of a few years ago.

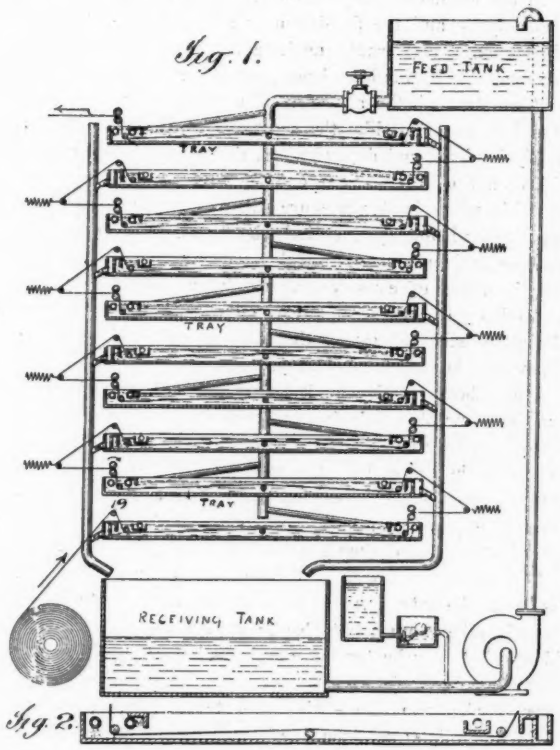
There are looms now being made which should have 10 per cent. of their first cost written off every year, for they cannot be worked economically more than 10 years, even if they reach that age.

Notices of mill projects, additions and improvements, in buildings and machinery, are solicited by COTTON.

DYEING APPARATUS FOR FULL WIDTH OF GOODS.

We show herewith in Fig. 1, a sectional diagramatic view of a form of dyeing apparatus, which, it is said, will insure uniform dyeing of the entire width of the goods to be dyed in horizontal shallow pans. Fig. 2 is an enlarged sectional view of one of the trays of this apparatus.

Primarily and essentially this apparatus consists of providing two inlet-pipes—one on each side of the line of travel of the cloth during the dyeing operation. By this means the dye liquid is immediately projected on both sides of the cloth and may be immediately taken up by the fabric surfaces. The pipes extend across the tray, particularly the pipe which is above the cloth, and at the outlet end of each tray there is provided two outlets—one on each side of the line of travel of the cloth. One of these outlets—the one above the cloth—is formed in the shape of the trough, so that the overflow may take place into the trough for substantially the entire width of the machine, while the other outlet is formed at the lower part of the machine in connection with an inverted-U-shaped baffle-plate which will direct the liquid from the bottom of the tray to such second outlet.



A second feature of the apparatus is to provide a means whereby the concentrated dyestuffs may be continuously fed to the circulating system, but means are provided for maintaining the concentrated dye liquid at a substantially constant head, so that a uniform mixture will be produced during the entire operation of the machine. To obtain this result there is inserted in the piping connecting the reservoir which holds the concentrated dyestuff and the circulating system an auxiliary chamber provided with a float-valve of the ordinary type to keep a uniform head in said auxiliary chamber.

LOGWOOD ON COTTON.

By N. E. W.

It is difficult to give a formula which will apply to logwood, whether on cotton or wool, as the grades sold vary so largely as regards strength and as to their nature, whether in an oxidized or an unoxidized condition.

For a grade selling around 5½ to 6 cents per pound, which, if bought at a competitive price, the following formula will be an approximate as to the general method: For 100 pounds raw stock cotton make up the dye bath with:

400 pounds of logwood,
30 pounds bluestone.
20 pounds soda ash.

Dissolve the logwood thoroughly, then add the bluestone and soda ash, bring to a boil before stock is entered, until carbon dioxide gas is given off, smother over night and let drain.

For the second kettle, same amount of stock, use
300 pounds logwood,
30 pounds bluestone,
15 pounds soda ash.
Dissolve logwood and chemicals as in the former dyeing.
Third and standing kettle. For 100 pounds stock use,
250 pounds logwood,
30 pounds bluestone.
15 pounds soda ash.

The proportion of logwood in the above formula is for the production of a very heavy shade. For a medium shade of black, as required in most mills, not over 15 pounds to 100 pounds of stock is used in the standing bath, and in working the logwood down it is not necessary to use such a large amount as stated above.

Theoretically, it takes 42½ pounds soda ash to neutralize acid contained in the 100 pounds bluestone, by liberation in the dyeing process. More soda ash will make shade redder on standing, but greener at time of dyeing. Bluestone usually reddens the color at time of dyeing. For the more concentrated logwoods, not over 10 per cent. in a standing kettle is required, and the percentage of salt should be cut down accordingly. The dyer is usually familiar with his grade of logwood, and changes his formula considerably for producing the different shades wanted, either by the use of bluestone and soda ash or the use of some bark extract.

For dyeing cotton warps with logwood the usual precautions should be followed by dividing the dissolved logwood and adding for first two runs in the dye bath. Afterward running the warps through the dye bath twice, and allowing to smother on trucks.

The single-bath method on cotton is now generally used, especially where a bloomy black is required at a low cost and fastness is of no essential value. The single-bath system is used especially where cost of dye is not great in comparison with time and labor.

Logwood is a representative of that class of colors which are fixed on the fiber in the form of a metallic sale. Not only is logwood a useful color for black, but it is still employed in producing other shades.

A logwood gray is obtained by working cotton in a warm bath with 2 or 5 per cent. of the extract. The warps are then passed through a weak solution of ferrous sulphate, or bichromate of potash. Different shades of gray

are produced by adding logwood, cutch extract, fustic, or any material of natural tanning matter.

The use of logwood for the production of blues and purples has been almost superseded by anilines. The tests for logwood on a fabric will give with the following reagents these reactions: Muriatic acid will turn fiber from red to olive brown, the resulting solution is red.

Sulphuric acid will give the same reactions, with caustic, the solution becoming purple. The same reactions also follow with ammonia.

WATER FOR DYEING PURPOSES.

BY D. W. H.

For satisfactory results in dyeing as well as bleaching, water should be carefully examined as to its qualification for use.

Distilled water is always used in laboratories for matching shades. This, of course, is impractical in a large way, so the next step is to procure water as free as possible from lime, iron or organic matter, as abounds in many localities.

Hard water is formed by the natural water coming in contact with some limestone which combines with the carbon dioxide or the air forms a carbonate of lime. This can be removed by boiling and such water is classified as temporary hardness.

Should the water come into contact with rock containing sulphate such as sulphate of calcium or magnesium, we have a permanent hardness owing to the insoluble condition of all sulphates.

We find, especially in the South, water coming in contact with rocks containing iron. Such water is known as chalybeate water. Impurities exist in either a suspended or dissolved condition. One finds the former usually in river water, and the latter in water from wells or springs. We may rid the suspended impurities in many cases by allowing the water to stand. There are also several useful and ingenious filters placed on the market which are valuable for this purpose. When impurities are in the dissolved state, they are always a source of worry to the dyer and bleacher. Temporary hardness is caused by the presence of bicarbonate of calcium and magnesium, and is usually determined by a standard soap solution.

Hard water does not necessarily mean that it is always impractical for use. Some colors, especially Turkey red, are benefited by the use of water containing calcium or magnesium. In a bleachery, however, such water should be avoided. For the ordinary shades, those dyed with a heavy per cent. of color, it is not necessary to correct the water. If the impurities are in a suspended condition, the water is pumped into a large tank and the impurities settled out. With direct colors and most wood colors, the water is pure enough for all practical purposes. Should the water be in a condition of temporary hardness, it should be boiled, the bicarbonate being destroyed and the carbonate precipitated. If a certain addition of sodium carbonate is added, both the temporary and permanent hardness is removed. One may also correct water by use of some organic acid, such as acetic or formic. This should be used, however, only for basic colors.

To detect qualitatively, the simplest methods are as follows: If a solution of ammonia oxalate is added to the water, lime will be precipitated as calcium oxalate. In an evaporating dish concentrate the water and it will become turbid, then add a few drops of muriatic acid. If it effervesces, caused by carbondioxide being driven off, lime is present as a bicarbonate. If the lime is present as a sulphate, there will be no clearing or effervescence. To detect magnesium, filter the water after the ammonia oxalate is added. Concentrate liquid and add a solution of phosphate of soda and ammonia—a crystalline precipitate will denote magnesium.

Without doubt, the best practical method for detecting hard water is by a standard soap solution. Hard water is usually estimated in degrees of hardness; a thousand gallons of water of one degree of hardness will dispose of one and one-half pounds of soap. If a quantitative analysis is made of the water, and the calcium carbonate is determined, then one degree of hardness is equal to one gram of calcium carbonate in 100,000 parts water. If water contains five to ten degrees hardness, it is usually impractical for use in a large way for dyeing and bleaching purposes, as a large amount of soap would be destroyed and the cost of manufacture increased thereby.

MECHANICAL DEPARTMENT OF DYEING.

In the mechanical department of dyeing, improvements in machinery and the displacement of hand work by machinery, have been sadly neglected. Even in instances, where suitable means have been proposed and the necessary plant constructed, the adoption of machinery has not progressed at anything like the same rate as in other trades equally intricate and dependent on somewhat similar physical laws and consideration. Even at the present time, there are works where hank yarns are still wrung and freed from liquor after being dyed entirely by hand, in spite of the existence and paramount usefulness of the hydro-extractor. Such instances of conservatism are by no means few, but the tendency of more enlightened controllers of works is to take all possible advantage that may be gained by the use of new and improved machinery.

Particularly within the last few years, it may be said that the principle of dyeing under mechanical pressure, as far as raw stock and yarns in all stages of manufacture are concerned, has now left the experimental stage, and, in spite of pessimisite predictions with which recently constructed apparatuses have been greeted, has proved in many instances a marked success.

The success met with in dyeing cops, cones and spools, has led to the extension of the principle, not only to cotton yarns in other forms, but also to woolen yarns. With the aid of what may be termed a universal machine, it is now possible to dye and treat loose cotton, slivers, rovings, cops, cones, hanks, warps, slubbing and tops. These improvements naturally ensue from the increasing use of machinery in the dye house, and, indeed, the innovations on the mechanical side are due entirely to the changes which have taken place in the introduction of new coloring matters, and the turning point was undoubtedly made with the discovery and the extensive use of sulphur colors.

Some firms deduct depreciation from what they call their net profits, a procedure which is not a serious mistake, but which gives an erroneous opinion as to what the actual profits are.

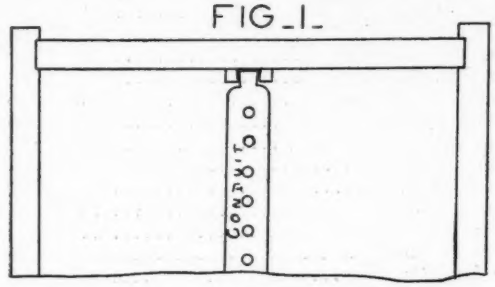
Send notices of Overseer changes to COTTON.

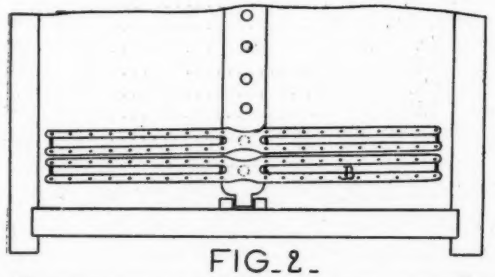
DYEING YARN ON COPS.

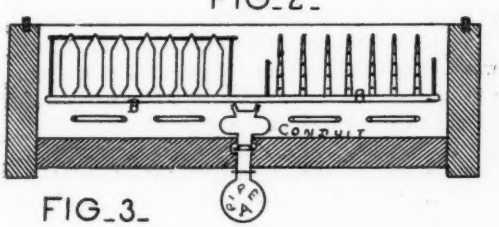
We show, herewith, an apparatus for dyeing threads of yarn on cops or pirns.

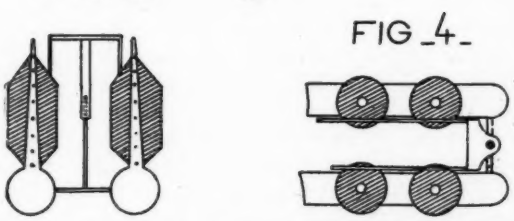
Fig. 1 is a plain view, and Fig. 2 a transsection of a vat; Fig. 3, an elevation, on an enlarged scale, of the end of a pair of tubes; and Fig. 4, a plan view of this end.

In this arrangement the cops to be dyed are mounted on hollow perforated spindles permanently fixed on the pipes conveying the dye-bath. These pipes are connected in sets of four by means of a union which connects with a central conduit running from one end of the vat to the other. This central conduit is movable and is detachably connected, by









means of lower tubes, to another conduit fixed on the bottom of the vat. The spindle-carrying pipes thus form a sort of rack in one with the central feed-conduit and may be removed as a single piece. In this manner the handling is said to be extremely simple, resulting in a saving of labor and efficient working of the vat. Further, by this means the cops when placed on the spindles cannot be displaced or lifted by the pressure of the liquid, because they are held by means of strips, which prevent their lifting.

The working of the apparatus is as follows: When the spindles have been fitted with cops or pins and the whole is placed in the vat and the lid fixed, the vacuum-pump is set in operation. The dye-bath is then drawn into the vat by a pipe *A*, a conduit, the pipes *B*, and the perforated spindles through the cops or pirns. By opening an air-trap, pressure is reestablished in the upper part of the vat, and the dye-bath redescends by gravitation.

The operation may be repeated several times if such be deemed necessary. Washing may be done in the same manner. The liquid may also be caused to circulate in the vat by means of a pump. When the operation is terminated, the conduit and all the pipes, carrying the spindles with their bobbins, is removed in a single piece, and the vat is provided with a fresh set of pipes carrying spindles, which has been prepared outside the vat.

From this it is evident that the operations in the vat may succeed one another without interruption other than that necessary for removing one set of spindle-carrying pipes and replacing it by another, which operation is facilitated by the circumstance that all the pipes are mounted on the central conduit, so that they may be simultaneously removed. The cops may be dried on the spindles by sending a current of warm air under pressure through the central conduit and forcing it through the cops.

BEETLE FINISHING.

In an article in a foreign exchange on the above subject, the writer states that the main consideration for beetling is to obtain a thoroughly even condition for the cloth, and recommends as the best method a "thorough drying of the cloth first, and then imparting the requisite amount of moisture by means of a damping machine." The writer apparently condemns conditioning on the drying cylinders as not being satisfactory.

Another writer in commenting on this statement, and admitting the usefulness of the spraying machine for damping, questions the statement that conditioning on the drying cans is rarely ever satisfactory. In support of this he goes on to say that "the fiber of the cotton, after the bleaching process, has become so thoroughly impregnated with water, and all the resinous matter so softened, that it is more pliable and capable of giving better results when (say) half-dried, both as regards closeness and fuller feel, than ever can be effected after the fabric has been thoroughly dried; and this gummy resinous matter (which it is impossible to clear entirely from the internal cells of the cotton by the bleaching process) sets hard and crisp. This somewhat explains the fact that cotton after drying feels crisp and rough.

"If the cloth be thoroughly dried and allowed to cool, and be then conditioned on the damping machine, we must remember that the greatest portion of the water lies only on the surface of the fabric, and cannot penetrate into the interior of the cells of the cotton. Therefore we lose what we wish to attain, that is, a thoroughly conditioned cloth, so that the fallers of the beetling machine may mold and close up the yarns and increase the luster and linen-like appearance, so essential in beetle finishing. In the case of all cloths that require well closing, whether chased on calenders or beetled, the cloth should not be thoroughly dry from the moment it goes into the bleacheroft until the last stage of the finishing process.

"It requires careful attention on the part of the attendant on the conditioning cylinders, and only steady, reliable men should be chosen, for the least carelessness will ruin

a finish of this description. I have had under observation for many years the finishing of goods conditioned on drying cylinders and also dried up and damped on the spraying machine; but the conditioning on cylinder is by far the more satisfactory of the two."

GERMANY'S LEAD IN CHEMICALS.

The remarkable development of the chemical industry in Germany is attested by the fact that that country produces annually a million tons of sulphuric acid and half a million tons of soda.

As to pharmaceutical products, the quinine alone exported from the Fatherland is valued at about $3,333,000, and antipyrine and antifebrine at an equal amount. The colors, acids, and chemical manures exported are valued at about $166,000,000. "One may then assert without fear of contradiction," said a manufacturer in speaking of the results achieved, "that to-day Germany furnishes five-sixths of the dyes used in the whole world."

The secret of German success lies in the fact that they have an army of scientific men from which they are now reaping the benefit of years of work and expenditure. At one plant alone, no less than 190 chemists work all the year in search of new products. The advantage of combination is also stated by a German chemical manufacturer, who merged his interests with another factory and effected great savings. Thus the two factories do not compete abroad. One has branches at Lyon and Riga, the other at Creil, Moscow, Augsburg, and Milan. One of the factories gave up the production of acids and salts, securing them from the other where they were produced much cheaper.

A competent authority states that the 9,000 factories and 200,000 workmen engaged in the chemical industry of Germany turn out products of which the annual value is about $357,000,000. And yet this industry is scarcely thirty years old. In fact, a German manufacturer states that "thirty years ago England was mistress of the market for salt and alkalies as well as for coloring matter extracted from coal tar; to-day Germany is at the head of all the manufacturing nations of the world, not only for dyes, but for chemical and pharmaceutical products."

SOUTHERN COTTON MILL STOCKS.

	Bid.	Asked.
Anderson Cotton Mills, S. C.	74	75
Arkwright Mills, S. C.	112	115
Avondale Mills, Ala.	125	...
Belton Mills, S. C.	110	...
Bibb Mfg. Co., Ga.	..	113½
Brandon Mills, S. C.	125	135
Cabarrus Cotton Mills, N. C.	127	135
Chiquola Mfg. Co., S. C.	121	126
Clifton Mfg. Co., S. C.	115	120
Courtenay Mfg. Co., S. C.	..	100
Columbus Mfg. Co., Ga.	96	101
Dallas Mfg. Co., Ala.	96	100
Darlington Mfg. Co., S. C.	80	82
Eagle & Phoenix Mills, Ga.	130	137½
Easley Cotton Mills, S. C.	140	...
Enoree Mfg. Co., S. C.	70	80
Enterprise Mfg. Co., S. C.	90	94
Exposition Cotton Mills, Ga.	225	240
Gaffney Mfg. Co., S. C.	92	94
Gainesville Cotton Mills, Ga.	59	65
Graniteville Mfg. Co., S. C.	165	170
Greenwood Cotton Mills, S. C.	97	98½
Grendel Mills, S. C.	119	...
Henrietta Mills, N. C.	161	175
John P. King Mfg. Co., Ga.	97	100
Lancaster Cotton Mills, S. C.	110	...
Langley Mfg. Co., S. C.	101	...
Laurens Cotton Mills, S. C.	150	160
Lockhart Mills, S. C.	92	98½
Louise Mills, N. C.	90	95
Marlboro Cotton Mills, S. C.	91	92
Mayo Mills, N. C.	165	185
Mills Mfg. Co., S. C.	110	...
Monarch Cotton Mills, S. C.	102	110
Monaghan Mills, S. C.	115	120
Newberry Cotton Mills, S. C.	138	150
Norris Cotton Mills, S. C.	122	125
Olympia Cotton Mills, S. C., Pfd.	70	71
Orangeburg Mfg. Co., N. C., Pfd.	80	97
Orr Cotton Mills, S. C.	107	108½
Pacolet Mfg. Co., S. C.	..	175
Pelzer Mfg. Co., S. C.	165	175
Piedmont Mfg. Co., S. C.	165	175
Poe Mfg. Co., F. W., S. C.	..	135
Raleigh Cotton Mills, N. C.	100	105
Roanoke Mills, S. C.	150	167½
Saxon Mills, S. C.	..	130
Sibley Mfg. Co., Ga.	63	65
Southern Cotton Mills, N. C.	..	...
Springstein Mills, S. C.	..	100
Trion Mfg. Co., Ga.	127	137½
Tucapau Mills, S. C.	195	200
Victor Mfg. Co., S. C.	133½	135
Warren Mfg. Co., S. C.	92	93½
Washington Mills, Va.	30	40
Whitney Mfg. Co., S. C.	145	...
Wiscasset Mills, N. C.	130	136
Woodruff Cotton Mills, S. C.	127	135

THE SOUTHERN COTTON YARN MARKET.

We noted in our last month's report that the cotton yarn market was more or less demoralized, which condition has continued, and all attempts to stop a further decline in prices have been futile, and we are obliged to still record a downward tendency, making our quotations only approximate as they are subject to variation either above or below according to the position of the spinner.

There is evidence of a disposition, especially on the part of weavers, to take advantage of the low prices now being quoted, in making purchases for future wants, in the belief that spinners cannot make their product at present prices and see a profit in them, with the price of raw material where it is. We meet, however, in a number of instances, cases where spinners are holding their products at 1½ and two cents per pound higher than the quotations on certain counts which are in special demand, and for which orders are in hand to operate the spindles for a number of months to come. There is a well developed feeling that the price of cotton will be lower rather than higher than that now prevailing, with the effect of reducing the price of yarns both for weaving and for knitting.

The principal event of the past month has been the meeting of the Southern Soft Yarn Spinners' Association at Atlanta, Ga., at which over 250,000 spindles were represented. It was ascertained at this meeting that many of the mills in this association were sold ahead after the first of next year. In view of this showing it was deemed impossible to carry out any suggestion of curtailment of production, and, therefore, it was agreed that no curtailment should be proposed until the mills had caught up with their present orders. Should the decline in the prices of yarn

continue, a meeting of an advisory board will be called to again take up the matter of curtailment. The question of cancellations was discussed at this meeting, resulting in the following resolution being unanimously adopted:

"Resolved, That whenever an effort is made to cancel any order which has been placed with any member of the Association, we will not permit either cancellation or claim unless the said member is in fault; and, in case of final disagreement between the seller and purchaser, all the correspondence in the case shall be submitted to the secretary, who shall fully examine into the matter and shall correspond with the commission merchant or knitter who desires to cancel, and notify the offending party that the matter has been referred to the Association, and that said knitter or commission merchant is requested to submit such further evidence as he may wish. The advisory board shall look into the matter of such cancellation as so reported, and after careful consideration, if it is deemed advisable, suit shall be brought against the knitter or commission merchant to compel a performance of the contract—the expenses of said suit to be borne by the Association. In the event that the advisory board shall determine that there is not good ground for action, the complaining spinner shall be so notified, and the Association shall not consider the matter further."

We quote as follows:

SOTTHERN TWO-PLY SKEINS.

4s to 8s	18 @..	36s	35 @..
10s to 12s	18½@..	40s	36 @..
14s	19 @..	50s	53 @..
16s	19½@20	60s	63 @..
20s	21½@..	3-ply 8s upholstery	18¼@..
24s	23½@24	4-ply 9s upholstery	18¼@..
26s	24 @..		
30s	25 @..		

SOUTHERN SINGLE SKEINS.

4s to 8s	17½@..	22s	23 @..
10s to 12s	18 @18½	26s	24 @..
14s to 16s	10 @20	30s	26 @..
20s	22 @..		

SOUTHER SINGLE CHAIN WARPS.

8s to 10s	18½@..	22s	22½@...
12s	18½@19	26s	25 @..
14s	18½@19	30s	25 @26
16s	20 @21	40s	40 @..

SOUTHERN TWO-PLY CHAIN WARPS, ETC.

8s to 10s 2-ply	19 @....	24s 2-ply	23 @24
		26s 2'ply	24 @24½
12s to 14s 2-ply	20 @..	50s 2-ply	24 @25
16s	21 @..	40s 2-ply	38 @..
20s 2-ply	20½@22	50s 2-ply	50 @..

SOUTHECN FRAME PEELER CONES.

8s	20 @..	20s	53 @..
10s	20¼@..	22s	23¼@..
11s	20½@..	24s	24 @..
12s	21 @..	26s	24½@..
14s	21 @21¼	30s	26½@27
16s	22 @	40s	36 @37
18s	22 @22½		

A good, well-governed, smoothly-running engine prolongs the life of a loom more than is generally imagined.

New Machinery and Trade Notes.

CLAYTON & BENTLEY CO., Atlanta, Ga., manufacturers of the Clayton & Bentley automatic thin-place preventer, report recent large sales as follows: The John P. King Manufacturing Co., Augusta, Ga., after making a test run of thirty days with 200 looms equipped with this device, have ordered 1400 more looms equipped, which completes their mill. Pelzer Manufacturing Co., Pelzer, S. C., had 1,502 looms equipped with this device in July, 1907, and have very recently ordered 1,180 more looms equipped, which completes their mill. Massachusetts Mills in Lindale, Ga., have very recently ordered 832 looms equipped with this device. Their first order. Orr Cotton Mills, Anderson, S. C., have had 700 looms equipped with this device since June, 1907, and reported on Oct 14, 1907, that the device had already paid for itself. They also report that this device has reduced their cloth room expenses four per cent.

THE GANDY BELTING COMPANY, Baltimore, Md. We are in receipt of this company's catalogue relating to its manufactures of belting made from a fine-grained, specially woven, cotton duck; width being woven for each size of belt, thereby insuring a selvage and consequent even strain on both edges. It has no honeycomb stitching, all the rows being perfectly straight and sewn under tension from end to end, thus greatly adding to its durability. All parting or splitting of the ends is obviated, hence it gives no trouble from air puffs. It has great strength, traction power and durability. It is thoroughly stretched and seasoned, uniform in surface, runs straight, and does not slip or harden. It can be made in any lengths without joints.

STEEL HEDDLE MANUFACTURING COMPANY, Philadelphia, Pa. This company has issued a brochure that every manufacturer ought to have, relating to the flat-style heddles made by this firm, as furnishing valuable information regarding this important device in weaving. It describes the main features and advantages of this style of heddle, fully illustrated. This heddle is described as being very easily transferred, as any boy can transfer a thousand or more on to other rods in a few minutes. It has an eye that is punched out of solid metal, so that there is no possibility of a thread getting caught anywhere or in any part of the eye. The fact that the following mills, among many others, make use of it entitled it to recommendation: The Pierce Manufacturing Company and the Whitman Mills, New Bedford, Mass.; Asheville Cotton Mills, Asheville, N. C.; The New Market Manufacturing Company, New Market, N. H.; and the Arlington Mills, Lawrence, Mass.

A number of planters on the Sea Islands have been practicing a system of seed selection for many years. Each man has his own ideals respecting the best form of plant and the most profitable length of staple and selects a type conforminng most closely to this ideal.

The common practice of renting land for a share of the cotton crop greatly hinders the adoption of improved methods. It means instead the continuous planting of cotton without attention to seed selection or soil improvement.

Swedish lace, though interesting as the survival and revival of a traditional industry, is not in itself ordinarily very beautiful or very fine in workmanship.

A NEW YARN TESTER.

The Draper Company, Hopedale, Mass., has made arrangements with Cook & Company, Manchester, England, to introduce their single thread testing machine, made under the Moserop patent, which has met with marked success in England, and there is no apparent reason why American manufacturers should not find it equally important. The accompanying illustration shows the machine.

The automatic method of skein testing gives but little information as to the individual yarns comprising the skein, and the single thread testing machines in common use require wearisome attention and delay, the results also being governed more or less by the human control of the testing apparatus. While the testing of yarn in the skein may give a fair average idea of the strength of the fibers, or the general conditions of manufacture, it does not enable one to closely follow the various effects of different machinery,

methods or setting. An accurate and quick method of single yarn testing would enable a mill manager to test the actual conditions on any frame, or division of a frame, tracing any error immediately to its source. One very weak thread in a warp can give a weaver more trouble than 50 threads which are moderately weak. A skein made up of uneven yarn might show a very satisfatory average, due entirely to the strength of a small per cent. of the yarn; this strength, however, being of little practical advantage in the further process in which the yarn is used. The manufacturer is really and properly interested in the strength of the weakest yarns, and the weakest yarns can only be found by individual yarn tests.

This new automatic machine takes six bobbins, or cops of yarn, at one time, automatically seizes the yarn ends, winds off a certain length and then breaks it through spring pull, the breakage strength being directly registered on diagram paper, and the tested yarn is then cleared from the nips so as not to foul the next operation.

THE RICHMOND ELECTRIC COMPANY, Richmond, Va. This company issues regular bulletins concerning its products, several of which have come to hand, relating to their motors and generators.

BUFFALO FORGE COMPANY, Buffalo, N. Y. We are in receipt of this company's complete catalogue, dealers' edition, pocket size, for 1907. This size has found wide favor with dealers and jobbers everywhere for the reason that it fits a desk pigeon-hole as well as being convenient for the pocket. Those handling this catalogue frequently can obtain it bound in leather. This company makes hand blowers, portable forges, blacksmiths' drills, punches, shears, ventilating fans, pumps, etc.

FOSTER SUPERHEATERS. The Power Specialty Company, New York, have just issued the fourth edition on "Superheated Steam," with special reference to the Foster superheater, the peculiar construction of which is due chiefly to the result of actual experience in designing and building superheaters. For typographical effect and the general get-up of the pamphlet, make it one of the finest examples of trade publication that has yet appeared. Every steam user should procure a copy, as furnishing valuable information in relation to the economy of steam and fuel, applicable to all conditions in which steam is used.

POINTS TO BUSINESS MEN. A brochure under this name has been issued by Edmund Willcox, treasurer of the Empire City Audit Company, No. 1 Madison Ave., New York City, concerning auditing, financing, underwriting and bonding of industrial enterprises. Among the subjects treated may be mentioned the following: "Some Essentials to Success in Selling Stock;" "History of Underwriting;" "The Necessity of Auditing."

GOLDEN-ANDERSON VALVE SPECIALTY COMPANY, Pittsburg, Pa. We have received catalogue No. 9, 1907, showing this company's steam and water specialties, with special reference to their construction for the protection of life and property. Among the numerous valves made by this company may be mentioned its cushioned non-return valves, designed and built to meet the demands of steam and mechanical engineers for high grade automatic valves adapted to the highest steam pressures, and to continue in such services without chattering and hammering or sticking; furthermore, they are positive acting, and absolutely reliable in case of accident. These valves when placed between the boiler and header will equalize the pressure between the different units of a battery of boilers, as they remain closed as long as the boiler pressure is lower than that of the header. They will automatically cut off a boiler in case of accident to that boiler such as the bursting or collapsing of a tube, and will also act as a safety stop to prevent steam from being turned into a cold boiler, which also means a safeguard for men when working inside. This company also makes angle and globe valves with seat and disc positively self-cleaning, high and low pressure tilting steam traps, and many other kinds.

UNITED STATES MINERAL WOOL COMPANY, New York

City. A trade catalogue of this company is in the nature of a treatise on mineral wool, which is a vitreous substance converted to a fibrous condition, and partaking of the nature of glass without its brittleness, the fibers being soft, pliable and inelastic. One of the most important qualities of this wool is its great power to resist transmission of heat and cold. It is non-combustible, and practically indestructible by heat. As a protection against fire, properly used, it may be of inestimable value. It is used between the floors and in the walls of buildings to excellent advantage.

HOWARD BROTHERS MANUFACTURING COMPANY, Worcester, Mass. We are in receipt of a pamphlet issued by this company, giving tables of the number of feet of card clothing required to cover the various cylinders of cotton and wool cards. This pamphlet can, no doubt, be obtained by writing to the company. It is something that every carder should have as coming within his daily practice.

BOND FOUNDRY & MACHINE COMPANY, Manheim, Pa. This company manufactures power-transmitting machinery and supplies, such as shaft hangers, hanger boxes, shaft bearings, couplings, etc., all of which are illustrated and described in catalogue No. 4 of this concern.

COTTON SOFTENER. Loos & Dilworth, Philadelphia, have achieved very satisfactory results with their cotton softeners, "velvetine," "olivene" and "ideal," for which there is a steadily increasing demand in all parts of the country. The velvetine and olivene softeners, particularly for black-dyed hosiery and hosiery yarns, give a beautiful finish, imparting a silky lustre, intensifying the dye, and removing all traces of harshness from the goods. Many of the best-selling makes of hosiery on the market today, owe much of their success to the use of these softeners. Ideal softener, made with especial reference to the needs of the bleachery, is for use on either white goods, or goods of delicate shades. It enhances the delicacy of the colors, and leaves the yarns clean and sweet, and free from any suspicion of rancidity. All of these softeners commend themselves to the trade by the high-grade results obtained from their use, and by their moderate cost.

AMERICAN PULLEY COMPANY, Philadelphia. We have received a descriptive catalogue from this company of its all wrought-steel split pulley, which is made of the best grade of mild steel, the parts of which are struck up in dies and then assembled. This pulley weighs about half as much, size for size, as a cast-iron pulley. It saves power, and grips the shaft to perfection, and is safe under high speeds. It is bushed to fit shafts of different sizes, and can be applied without stripping the shaft, thus saving time and trouble. It does not shrink, swell, warp or burn, and is a model for strength, lightness, balance and elegant design.

REGULATION AND CONTROL OF CONCRETE CONSTRUCTION. The paper read by E. S. Larned, 101 Milk street, Boston, before the Association of American Portland Cement Manufacturers at Atlantic City, N. J., last September, has been published in pamphlet form, and can be obtained of the author.

C. B. THOMASON, who has been in the employ of the Whitin Machine Company, Whitinsville, Mass., for a number of years, has changed to take a traveling position with the Southern Card Clothing and Reed Company, Charlotte, North Carolina.

STRICKLES FOR CARDING MACHINES. Howard Bros. Manufacturing Company, Worcester, Mass., manufacture a new corundum hand-strickle, suitable for all round tempered steel wire used on workers, strippers, cylinders, doffers, rings, etc., used in regular carding, and for diamond point nappers used for napping suitings, flannels, flannelettes, dress goods, etc. The strickle made by this company cannot come apart at any place—the back is solid and the face is keyed on. Corundum cuts and grinds much faster than emery. With it the wire teeth are ground and finished smooth on both sides, with no burs or hooks. It combines rotary, side and needle-point processes in one.

LINDSAY, HYDE & COMPANY, Philadelphia. We are in receipt of catalogue from this company, showing their reels, hosiery winders, cop winders and spoolers for cotton, woolen, worsted and silk mills. Its reels are fitted with cross traverse motion, and with skein or weight motion. The cross traverse motion of this machine is geared, therefore positive, laying the yarn in regular courses, the gears being provided for either fast or slow motion, the swift automatically stops when the desired number of turns has been made. The hosiery winders take the yarn from skeins, cops or cones to bottle bobbins used on knitting machines, and are fitted with variable speed motion and with stop motions. The cop winders are built for any number of yarns from the finest cotton to the coarsest jute, each spindle being supplied with an independent stop motion, making each spindle a complete machine in itself.

DIAMINE FAST BLACK X. The Cassella Color Company, New York, has issued a small sheet showing the dyeings from its Diamine Fast Black X, which possesses excellent properties of fastness, particularly to light, and is distinguished for its fine blue-black shade, and may be used in any branch of the cotton dyeing industry, being especially suited for the dyeing of sewing yarn, hosiery yarns, piece goods and dress materials.

LOOM TUNING (LOOM FIXING). This is the title of a most excellent work by James Bailey, Head Master of the Textile Department, Municipal Technical Institute, Keighley, England, and can be secured of the COTTON Publishing Company, for $2.00. The author sets forth the principles which underlie the timing, setting and character of action given to the different motions of the loom in order to produce the best work under varying circumstances, and shows how many of the faults which arise may be remedied. It devotes chapters to shedding, picking, beating-up, warp protectors, shuttle changing motions, weft stop motions, let-off and take-up motions, selvages, and driving the loom. The book is fully illustrated, with original and practical diagrams.

WALTER B. SNOW, Publicity Engineer, 170 Summer St.,

Boston, Mass., announces that he is prepared to undertake work of any kind in the broad field of publicity for manufacturers of machinery and allied products. His regular services will cover the conduct, on a salary basis, of the publicity departments of a limited number of non-competitive clients. Special service will be rendered to others in the form of general advertising, catalogue making, technical writing and investigation. The intimate acquaintance with engineering in general, and publicity in particular, acquired during nearly 25 years' connection with the B. F. Sturtevant Co., encourages him in the belief that this service can be made of exceptional value.

HENDRICK'S COMMERCIAL REGISTER OF THE UNITED STATES. The S. E. Hendricks Co., New York, has just issued its Annual Commercial Register of the United States, especially devoted to the architectural, engineering, electrical, mechanical, railroad, iron and steel, and kindred industries. This register contains about 1300 pages and upwards of 350,000 names and addresses, classified under 31,212 trade headings. It is the only publication that is thus classified, and can be used for either purchasing or mailing purposes, and all together furnishes material for making a most complete reference book for buyers and sellers. Price, $10.00.

NATIONAL BRAKE & CLUTCH COMPANY, Boston, Mass. We are informed that the patented fiber rings with cork inserts, advertised in this issue and sold by this company, for use on the frictions of both old and new looms, are giving the best of satisfaction, and are being largely ordered by mills to replace leather facings which are worn or not giving satisfactory service. One large mill has recently ordered six hundred looms fitted with these frictions. The Wood Worsted Mill, Lawrence, Mass., has one thousand looms fitted with cork insert frictions, and trial orders placed by a number of mills have resulted in large duplicate orders, the rings being carried in stock and applied as fast as the leather frictions cease to give satisfaction.

ENTERPRISE OF A SOUTHERN MAN.

The splendid enterprise and energy of Southern business men and manufacturers is again well illustrated by Howell A. Davis, Palatka, Fla. Six months or more ago the firm of G. M. Davis & Son was put out of business by the destruction of their entire plant and stock of lumber by fire. Immediately after the fire, Mr. Davis, of Palatka, who is the sole owner of the business, commenced the erection of a new factory on a larger scale and with much increased equipment. Undaunted by previous disaster, he has succeeded in erecting a factory which is a credit to his energy and enterprise, and of which Palatka citizens have every reason to be proud. An entire block is occupied by the factory and lumber yard. The main body of the factory is 154 feet long by 64 feet wide, with a large wing. The handsome office in the main building is elegantly paneled with the highest grade of selected black cypress lumber. A capacious fire-proof vault is a part of the equipment. The total floor space of the factory is nearly 15,000 square feet. All the machinery is of first-class construction in the latest improved patterns. Electricity is employed as motive power, a separate motor being provided for each machine. The factory is also equipped with the latest designed blow pipe system for the collection of shavings and refuse, conveying the same to the burners. Excellent side track facilities for receiving lumber and shipping factory products have been provided. During the work of erecting the factory, Mr. Davis has accumulated a large stock of lumber, and has now nearly 1,000,000 feet of seasoned cypress on hand with which to fill the many orders that have already been booked. It is conceded by competent judges that this is the most complete and modernly equipped factory of its kind in the South.

THE ECONOMICAL AND SUCCESSFUL MANAGEMENT OF COTTON MILLS. This is the title of a book of 221 pages, by Henry D. Martin, consisting of a number of articles that he has contributed to technical publications, and is intended as a hand book giving practical talks on practical subjects showing methods and rules whereby an executive in any capacity may post himself more clearly in regard to his business and learn more perfectly the duties of his various lieutenants. The work is prepared especially from the cotton manufacturers' standpoint. The price is $1.50, and can be obtained of COTTON Publishing Co., Atlanta, Ga.

J. L. DAVIS.

From Sweeper-Boy to Superintendent.

J. L. Davis was born June 15th, 1866, at what is now known as Reedy River, seven miles below Greenville, S. C. At the age of nine years he went to work in a paper mill of Dr. W. R. Jones, near Reedy River, and worked there until he was twelve years old.

At the age of fourteen, he went to work as a sweeper-boy in the old No. 1 Camperdown Mill, at Greenville, and stayed there for one year, when he went to the No. 2 Camperdown Mill, to oil and do the banding in the spinning room. These mills shut down in March, 1885, which put him out of work, though but for a short time, as in the following month he went to Augusta, Ga., and entered the employ of the John P. King Mfg. Co., as a section hand in the spooling department. He was then transferred to a section in the spinning room.

In August, 1888, he went to the Dartmouth Mill, now known as the Sutherland Mill, as second hand, and retained this position until November, 1889, being promoted to the position of overseer of the mule and ring spinning, which position he resigned in May, 1891, going to Charleston, S. C., as second hand in the old Charleston Cotton Mill, where he remained three months, leaving to take charge of the spinning and twisting at the Richmond Cotton Mills, near Augusta, Ga. He stayed there until the mill shut down in March, 1893.

He then took charge of the night spinning at the Globe Cotton Mills, Augusta, Ga., leaving this position in November, 1893, when he went to the Orange Cotton Mills, Orangeburg, S. C., to take charge of the spinning and twisting, which position he held until November, 1898, going to the Asheville Cotton Mills, Asheville, N. C., as spinner, and leaving there May 1st, 1901, to take charge of the spinning in the Belton Mills, Belton, S. C.

In March, 1905, he was chosen superintendent of the Hermitage Cotton Mills, Camden, S. C., leaving there May 13th, 1907, to take the superintendency of the Ninety-Six

Cotton Mills, Ninety-Six, S. C., which position he now holds.

J. L. DAVIS.

A. S. WINSLOW.

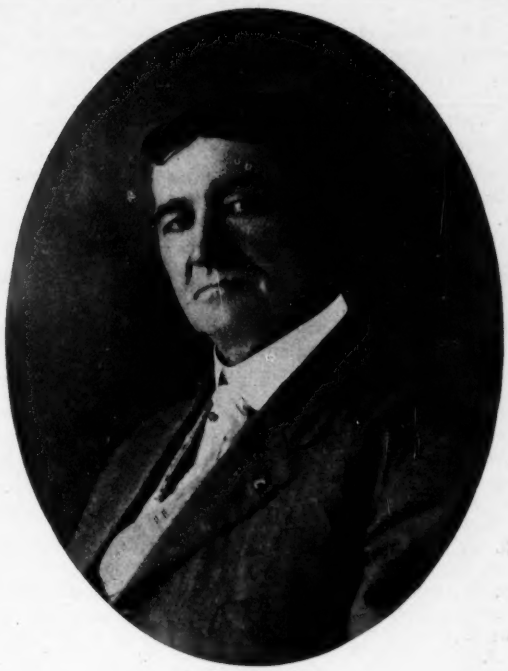
Thirty-five Years in Cotton Manufacturing.

A. S. Winslow is now little over fifty years of age, and has been connected with cotton manufacturing for thirty-five years, working himself up from the very bottom to positions of superintendent and agent in New England mills, manufacturing such goods as sheetings, shirtings, corduroys, velvets, plushes, plain and fancy dress goods, chambrey, ticks, denims, and nearly every style of cotton goods produced in this country.

He started as a poor boy, and worked his way up, entirely through his own efforts. His father and mother died when he was twelve years of age, leaving him to look after himself. He has been in the South for the last seven years, coming from Rhode Island.

Mr. Winslow has assumed the superintendency of the Anderson Cotton Mills, Anderson, S. C., coming from the Inman Cotton Mills, Inman, S. C., where he held the positions of superintendent and was well thought of because of his efficiency and for his uniform kindness to those under him.

While at Inman he was a trustee of the graded school at that place, trustee of the Spartan High School, Landrum, S. C., and a trustee of the Orphanage of the I. O. O. F., at Greenville, S. C. The pastor of the church at Inman that he attended, speaks of him as having done great good as superintendent of the Sunday school at the mill village, and it was through his influence that a little chapel was built "seated with chairs and equipped with an organ and other necessary conveniences for Christian work. He has been the efficient teacher of a Bible class and Sunday school at the Inman Baptist Church, and has filled with



A. S. WINSLOW.

credit to himself the position of chairman of the Deacons' Board."

C. B. Coward, overseer of spinning at the Dallas Mills, Huntsville, Ala., is back again at his post after an absence of ten days on account of sickness. Mr. Coward has been with the Dallas Mills since last August, and has worked in cotton mills fifteen years, for nine years of which time he has been an overseer.

Send notices of Overseer changes to COTTON.

Proper repairs will most certainly lengthen the life of a machine, and so reduce the annual depreciation allowance, but they cannot replace it.

The class of labor employed has a very marked influence in the life of a machine, and should therefore be considered when allowing depreciation.

Amongst the more advanced manufacturers it is often seriously asked, "How much should be written off each item of capital expenditure to allow for depreciation?" To be exact is an impossibility, for although the wearing capabilities of a machine may be guaged with some accuracy, it is obviously difficult to foresee, say, the introduction of a new type of machine, which will reduce the old one to scrap-iron value in a few months, even when it has years of life left.

There is much complaint from the spinners of an undue amount of nep, or white knots of tangled fibers in cotton from diseased plants, or in cotton picked too green or not properly ginned.

AMONG SUPERINTENDENTS, OVERSEERS AND OTHERS.

We shall be pleased to receive notices of any changes among agents, superintendents, and overseers in textile mills.

A. C. Fennell is now superintendent of the Manchester Cotton Mill Company, Rock Hill, S. C.

James Byrd is now night superintendent of the Dillon Cotton Mills, Dillon, S. C.

J. V. McCombs has taken the position of overseer of spinning, carding, twisting and reeling in the Dudley Shoals Cotton Mills, Granite Falls, N. C.

B. G. Rhyne is now overseer of carding in the Delgado Mills, Wilmington, N. C.

James T. Redmond is now overseer of carding in Mills Nos. 1 and 2 of the Manetta Mills, Lando, S. C.

Warren Thompson is now overseer of spinning at the Grendel Mills, Greenwood, N. C.

George Y. Busbee has taken charge of the weaving for the Warren Manufacturing Co., Warrenville, S. C.

John Dent is now overseer of the cloth room at the Pine Creek Mill, Camden, S. C.

V. M. Johnson is now overseer of weaving at the Avondale Mills, Birmingham, Ala.

J. D. Lockey is now superintendent of the Gainesville Cotton Mills, Gainesville, Ga.

J. W. Lynn is now overseer of weaving in the Dover Yarn Mills, Pineville, N. C.

J. F. Wright is now overseer of spinning at the Marlboro Cotton Mills, No. 5, Bennettsville, S. C.

W. N. Wilson has taken the position of night superintendent at the Avon Mills, Gastonia, N. C.

S. L. Doggett has taken the position as overseer of dyeing at the Camperdown Mills, Greenville, S. C.

George K. Tate has taken charge of the Mecklenburg Cotton Mill, Charlotte, N. C.

G. A. Franklin has accepted the superintendency of the Walhalla Cotton Mills, Walhalla, S. C.

J. C. Montjoy has accepted the position of overseer of weaving at the Calhoun Mills, Calhoun Falls, S. C.

Walter Medlin is now overseer of spinning, reeling, twisting and spooling in the Levi Cotton Mill, Rutherford, N. C.

D. E. C. Clough is now overseer of spinning and twisting for the Fidelity Mfg. Co., Charlotte, N. C.

J. J. Huffstickler is now night superintendent of the Maple Cotton Mills, Dillon, S. C.

E. A. Holt has taken charge of the spinning and winding at the Hannah Picket Mills, Rockingham, N. C.

J. S. Cromer is now superintendent of the Bessemer City Cotton Mills, Bessemer City, N. C.

Hiram Dawson has taken the superintendency of the Spray Cotton Mills, Spray, N. C.

J. L. Hope has taken the position of overseer of carding at the Hannah Picket Mills, Rockingham, N. C.

F. Hamilton has been chosen superintendent of the Drayton Mill, Spartanburg, S. C.

R. F. McDaniel is now in charge of the beaming for the Roberdel Mfg. Co., Rockingham, N. C.

M. P. Petty is now in charge of the spinning, twisting and warping at the Avon Mills, Gastonia, N. C.

B. F. Spears has been appointed superintendent of the Marlboro Cotton Mills, No. 5 Mill, Bennettsville, S. C.

Fred Stott is now assistant overseer of mule spinning at the Bibb Manufacturing Company, Columbus, Ga.

E. N. Holliday is now overseer of the cloth room in the Granby Cotton Mills, Columbia, S. C.

W. F. O'Pry is now overseer of spinning at the Scotland Cotton Mills, Laurinburg, N. C.

E. H. Corborn has been appointed agent of the Stark Mills, Manchester, N. H.

W. L. Saunders has taken the position of overseer of carding and spinning for the Monroe Cotton Mills, Monroe, N. C.

W. B. Sawyer has accepted the position of overseer of carding for the Chadwick Mfg. Co., Charlotte, N. C.

J. Randolph French has been elected superintendent of the Statesville Cotton Mills, Statesville, N. C.

Benjamin Kirk has been appointed superintendent of the Estes Mills, Fall River, Mass.

Henry Garratt has taken the position as overseer of spinning for the Lincoln Manufacturing Co., Fall River, Mass.

John E. Rogan is now overseer of ring spinning for the Lawton Manufacturing Company, Plainfield, Conn.

Thomas Barry is now in charge of the spinning at the Warren Cotton Mills, West Warren, Mass.

Marcus Turbyfield has taken charge of the cloth room at the Arcade Mill, Rock Hill, S. C.

R. R. Scruggs, Jr., has been elected superintendent of the Henrietta Mills, Caroleen, N. C.

F. M. Mosher has taken the position of superintendent for the Edgefield Manufacturing Co., Edgefield, S. C.

George A. Gray has assumed the superintendency of the Arlington Cotton Mills, Gastonia, N. C.

J. B. Meacham is now superintendent of the Avon Mills, Gastonia, N. C.

W. F. Smith is now overseer of spinning at the Moultrie Cotton Mills, Moultrie, Ga.

G. W. McBroom has taken charge of the carding at the Wehadkee Yarn Mills, Rock Mills, Ala.

Smith Petty is now in charge of the spinning at the Lockhart Mills, Lockhart, S. C.

J. L. Kerley is now in charge of the carding and spinning at the Anchor Mills, Huntersville, N. C.

E. M. Walters is now in charge of spinning for the Chadwick Mfg. Co., Charlotte, N. C.

G. S. Jones is second hand in the card room at the Augusta Factory, Augusta, Ga.

Abel Cyr has taken the position of overseer of mule spinning at the Davol Mills, Fall River, Mass.

Charles Bowers is now overseer of filling spinning at the Gosnold Mills, New Bedford, Mass.

Fred Holt has been made overseer of mule spinning for the Bibb Manufacturing Company, Columbus, Ga.

T. L. Ellis is now with the White Oak Mills, Grensboro, N. C., as overseer of weaving.

J. P. Williams has taken charge of the spinning at the McComb City Cotton Mills, McComb City, Miss.

J. R. Wilson is now with the Continental Manufacturing Company, Charlotte, N. C., as overseer of twisting and winding.

L. L. Chandler has accepted a position as overseer of spinning for the Jonesville Manufacturing Company, Jonesville, S. C.

J. W. Jenkins has taken the position of superintendent at the Dover Yarn Mills, Pineville, N. C.

W. H. Howell is now overseer of spinning at the Cherry Cotton Mills, Florence, Ala.

John A. McFalls has taken a position as superintendent of the Eufaula Cotton Mills, Eufaula, Ala.

F. L. Lawhon is now overseer of the cloth room at the Cooleemee Cotton Mills, Cooleemee, N. C.

William Miller has become overseer of cotton for the Icemorlee Cotton Mills Co., Monroe, N. C.

J. W. Black is now superintendent of the Harmony Grove Mills, Commerce, Ga.

Albert Baechtold is superintendent of the Chinnabee Cotton Mills at Talladega, Ala.

G. D. Davis is now overseer of weaving at the Eufaula Cotton Mills, Eufaula, Ala.

W. A. Pierce is now in charge of the carding of the Eufaula Cotton Mills, Eufaula, Ala.

C. O. Edwards is now overseer of weaving for the Walton Cotton Mill Co., Monroe, Ga.